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COMMONWEALTH OF MASSACHUSETTS

SUMMARY OF WATER QUALITY

1977

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DIVISION OF WATER POLLUTION CONTROL

THOMAS C. McMAHON, DIRECTOR

DEPARTMENT OF ENVIRONMENTAL QUALITY ENGINEERING

DAVID STANDLEY, COMMISSIONER

COMMONWEALTH OF MASSACHUSETTS

SUMMARY OF WATER QUALITY

1977

Prepared By
Water Quality and Research Section
Massachusetts Division of Water Pollution Control

Westborough, Massachusetts

March 1977

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I

J.F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

July 11, 1977

Mr. Thomas C. McMahon
Director
Massachusetts Division of
Water Pollution Control
110 Tremont Street
Boston, MA 02108

Dear Mr. McMahon:

I would like to take this opportunity to thank you and your staff for your efforts in the preparation of this year's 305(b) Water Quality Inventory. We have already forwarded three copies of your report to Washington for transmittal to Congress. Incidentally, the New England region was the first region to have all the State's 305(b) reports completed and submitted to Washington.

We have utilized the information from your 305(b) report to prepare our Regional Administrator's Annual Report which we will be distributing in a few weeks. Although we intended to publicize major water quality improvements reported in the 305(b) inventory, your report indicated that the major improvements could not be substantiated this year. Because many of the major water pollution control efforts in your state have recently been completed or will be completed in the near future, I am confident that next year's 305(b) report will demonstrate some dramatic water quality improvements.

Thank you once again for your efforts in preparing this year's 305(b) Water Quality Inventory Report.

Sincerely yours,

Robert C. Thompson
Acting Regional Administrator

cc: A. Cooperman

TABLE OF CONTENTS

ITEM	PAGE
Foreword	3
List of Tables	4
Introduction	5
Present Water Quality - Blackstone River Basin	6
Present Water Quality - Boston Harbor	11
Present Water Quality - Buzzards Bay Basin	18
Present Water Quality - Charles River Basin	40
Present Water Quality - Chicopee River Basin	45
Present Water Quality - Connecticut River Basin	52
Present Water Quality - Deerfield River Basin	57
Present Water Quality - Farmington River Basin	62
Present Water Quality - French and Quinebaug Basin	64
Present Water Quality - Hoosic River Basin	67
Present Water Quality - Housatonic River Basin	71
Present Water Quality - Ipswich and Parker River Basin	80
Present Water Quality - Merrimack River Basin	82
Present Water Quality - Millers River Basin	88
Present Water Quality - Nashua River Basin	91
Present Water Quality - North River Basin	96
Present Water Quality - Suasco River Basin	99
Present Water Quality - Taunton River Basin	102
Present Water Quality - Ten Mile River Basin	107
Present Water Quality - Westfield River Basin	110
Conclusions	113
Appendix I: Rules and Regulations for the Establishment of Minimum Water Quality Standards and for the Protection of the Quality and Value of Water Resources	I-A

FOREWORD

The following report was prepared in response to Section 305(b) of the Federal Water Pollution Control Act Amendments of 1972 (PL92-500). This report is an up-date of a previous report published by the Massachusetts Division of Water Pollution Control (see Summary of Water Quality, State of Massachusetts 1976). It is an assessment of the present conditions of Massachusetts' river basins as of January 1, 1977.

The objectives of this report are:

1. To present the existing water quality of the main streams of the State, based on the latest available data;

2. To compare the existing water quality with the stream classification;

3. To evaluate water quality problems preventing the streams from meeting their assigned goals.

It should be noted that only major rivers and streams are evaluated in this report. Minor streams, most of which are presently meeting classification, are omitted due to data constraints. Also, although many new treatment facilities have gone into operation and many existing facilities have been improved or expanded over the past year, the resulting water quality improvements are unknown at this time. The reason for this is two-fold: the change in water quality evolves slowly and, in many cases, cannot be seen immediately; and the lack of data to evaluate the effects upon the streams. The overall result will be a dimmer view of Massachusetts' abatement achievements for this year. However, as data becomes available through routine monitoring, improvement will become apparent in the future.

Sections affected by non-point sources are not listed in this submittal. This information is currently not available. Existing major untreated discharges in many river basins mask any effects which might be present from non-point sources. Water quality surveys will be completed in the river basins after secondary treatment facilities have been completed. These surveys, which will be carried out over the next three years, along with results of various 208 studies, will locate sources and extent of non-point pollution.

LIST OF TABLES

TABLE	TITLE	PAGE
1	Classification and Segmentation - Blackstone River Basin	9
2	Classification and Segmentation - Boston Harbor	15
3	Classification and Segmentation - Buzzards Bay Basin	37
4	Classification and Segmentation - Charles River Basin	43
5	Classification and Segmentation - Chicopee River Basin	50
6	Classification and Segmentation - Connecticut River Basin	55
7	Classification and Segmentation - Deerfield River Basin	60
8	Classification and Segmentation - Farmington River Basin	63
9	Classification and Segmentation - French and Quinebaug Basin	66
10	Classification and Segmentation - Hoosic River Basin	70
11	Classification and Segmentation - Housatonic River Basin	77
12	Classification and Segmentation - Ipswich and Parker River Basin	81
13	Classification and Segmentation - Merrimack River Basin	86
14	Classification and Segmentation - Millers River Basin	90
15	Classification and Segmentation - Nashua River Basin	94
16	Classification and Segmentation - North River Basin	98
17	Classification and Segmentation - Suasco Basin	101
18	Classification and Segmentation - Taunton River Basin	105
19	Classification and Segmentation - Ten Mile River Basin	109
20	Classification and Segmentation - Westfield River Basin	112
21	Water Quality Inventory Summary	114

INTRODUCTION

EXISTING WATER QUALITY

The Division has a policy of publishing a series of reports on water quality for various river basins within the state. These reports began with the publication of data obtained from intensive water quality surveys and analyses of waste discharges and have become known as Parts A and B for the particular basin. To make the engineering data from these reports meaningful to the general public, a third type of report (Part C) was developed to present a written and graphic analysis of the data, together with historical, hydrologic, and socio-economic information relating to water quality. Early reports of this type also proposed long-range solutions to water quality problems. After passage of PL92-500, it was decided that a fourth report--a Water Quality Management Plan (Part D)--would be the appropriate vehicle for presenting long-range solutions to water quality problems, since they would contain detailed data and analysis employed to formulate the solutions.

The goals of the Water Quality Management Plans were set by the appropriate Water Quality Standards. The Water Quality Standards consist of definitions of the use classifications, general regulations, present and future use classifications of the waters of the Commonwealth, and plans of implementation to meet the future use classifications.

The Commonwealth of Massachusetts is divided into twenty-seven major drainage basins for the purpose of water quality management planning. The basins are the Massachusetts portions of the following rivers:

Hoosic River
Housatonic River
Deerfield River
Westfield River
Farmington River
Connecticut River
Millers River
Chicopee River
French and Quinebaug Rivers
Nashua River
Blackstone River
Merrimack River
Buzzards Bay Drainage Area
Ten Mile River
Concord and Sudbury Rivers
Assabet River
Shawsheen River
Parker River
Ipswich River
North Coastal Drainage Area
Boston Harbor
Charles River
North River
South Coastal Drainage Area
Cape Cod Drainage Area
The Islands
Taunton River

The Division of Water Pollution Control has developed an intensive monitoring program for each of these drainage basins. This basin monitoring program is the result of a continuing effort on the part of the Division to establish a set of guidelines for the abatement of water pollution in the Commonwealth. Documentation of the progress made towards meeting water quality goals through the implementation of these basin plans is achieved by the water quality monitoring program and is published in the series of reports for the particular basin.

The following is a basin-by-basin summary of the existing water quality, stream classifications, and water quality problems of the main streams of the Commonwealth. The reader is referred to the latest publications of a particular basin for more complete details.

BLACKSTONE RIVER BASIN

Present Conditions

Segment 1 - Kettle Brook Reservoirs - The four reservoirs and their tributaries are classified anti-degradation due to their use as public water supply by the City of Worcester. No known water quality problems exist on the reservoirs.

Segment 2 - Kettle Brook from last reservoir to Waite Pond outlet - Results of the June 1973 survey indicated slight algae and color problems; these problems were not repeated in July, so they have been rated as "slight." Probable causes are failing septic systems along the edge of the pond.

Segment 3 - Kettle Brook from Waite Pond outlet to Curtis Pond outlet - Problems include slightly high coliform bacteria in the Cherry Valley section of Leicester, high metals concentrations and low pH for one mile below National Standards, occasional oil slicks throughout the length of the segment, and highly turbid appearance throughout due to urban runoff.

Segment 4 - Middle River from Curtis Pond outlet to American Steel dam- Slight coliform, D.O., nutrients, and moderate turbidity problems attributable to urban runoff. Beaver Brook, which enters at the head of the segment, was affected by combined sewer overflows until the fall of 1973.

Segment 5 - Blackstone River from American Steel dam to Upper Blackstone Sewage Treatment Plant outfall - Severe coliform, D.O., solids, and nutrients problems are caused by combined sewer overflows to Mill Brook Canal, an underground stream which enters at the head of the segment. Slightly high metals concentrations and frequent oil slicks also result from these discharges.

Segment 6 - Blackstone River from Upper Blackstone Sewage Treatment Plant outfall to Millbury STP outfall - The problems in segment 5 are compounded by the discharge from the treatment plant. Metals concentrations increase due to Johnson Steel and Wire discharge.

Segment 7 - Blackstone River from Millbury outfall to inlet, Fisherville Pond - Severe problems from the previous segments continue. During the 1973 surveys, the low point of the D.O. sag below Worcester occurred in this segment. Slight increases in solids and color were observed below Snider Brothers Beef; negligible impact from Millbury treatment facility. Slight metals problems in this segment and the two following can probably be attributed to bottom sediments.

Segment 8 - Blackstone River from Fisherville Pond to Farnumsville Pond outlet (Grafton STP site) - Coliform bacteria somewhat less than previous segment. Severe D.O., solids, nutrient problems continue. Although the survey results indicate improvement in these constituents from the previous segment (due primarily to dilution from the Quinsigamond River), the higher criteria (Class C) assigned to this segment are not met.

Segment 9 - Blackstone River from Farnumsville Pond outlet to Northbridge STP outfall - D.O. problem rated moderate as minimum concentration of 3.0 mg/l was maintained during survey and BOD_5 decreased substantially from previous segment. Other problems from previous segment continue. Several private dumps and automobile graveyards lie adjacent to the river in this segment.

Segment 10 - Blackstone River from Northbridge outfall to Mumford River - Slight increases in nutrients were observed below Northbridge in 1973, prior to the completion of renovations to that facility. Coliform problem decreases to slight. Carbonaceous oxygen demand from Worcester discharges is mostly satisfied; nitrification dominates in the lower portion of this segment. Ammonia concentrations fall below the toxicity level for fish due to nitrification.

Segment 11 - Blackstone River from Mumford River to West River (Uxbridge STP site) - Slight increase in solids and color caused by Stanley Woolen discharge to the Blackstone and Emil Bernat discharge to the Mumford (just above confluence); otherwise, problems from previous segment continue.

Segment 12 - Blackstone River from West River to state line - D.O., solids improve somewhat through this segment; Class C D.O. standards were actually met at the state line in 1973. Appearance of the stream is still extremely poor, however, and nutrient concentrations are high.

Segment 13 - Quinsigamond River - Moderate nutrient and slight coliform problems were observed on Hovey Pond below Wyman-Gordon discharge and in Lake Ripple below North Grafton and Grafton center. Heavy algae growths resulting from the nutrients cause D.O. concentrations to vary from supersaturated levels down to minimum values below the Class B criterion of 5.0 mg/l.

Segment 14 - Mumford River above East Douglas - Slightly high coliforms and nutrients were observed in the Manchaug section of Sutton. Otherwise, Class B criteria were exceeded throughout this segment.

Segment 15 - Mumford River from East Douglas to Blackstone River - Solids, color, D.O. problems below Hayward Schuster Woolen discharge; moderate nutrient, slight coliform problems throughout segment. High turbidity throughout. Untreated sewage from North Uxbridge and Uxbridge Center affects the lower three miles. Frequent oil slicks observed in this segment.

Segment 16 - West River - Class B criteria are essentially met throughout. Slight D.O., nutrient problems observed in swampy area at the headwaters and below several farms in Uxbridge. No discernible effects from the Upton Sewage Treatment Plant.

Segment 17 - Mill River - Severe coliform, D.O., solids, nutrient problems observed for about one mile below the Hopedale Sewage Treatment Plant. Below that point, problems gradually decrease to slight. Some evidence of non-point contributions from gravel pits in Hopedale, farms in Mendon, malfunctioning septic tanks in Blackstone.

Segment 18 - Peters River - No data available; no known problems. This stream is listed as a segment because it is a significant tributary draining moderate-to-heavily populated, unsewered areas of Bellingham.

Segment 19 - Beaver Brook - Much of this stream flows under the Elm Park section of Worcester. Samples collected near the mouth indicate moderate coliform, solids problems, and slight D.O., nutrient problems. Occasional evidence of oil, metals. All of these are due to storm drains with possible illegal connections.

Segment 20 - Mill Brook - Upper portion, including Weasel Brook, is subject to urban runoff and several small, treated discharges. From Salisbury Pond to the Blackstone River, Mill Brook is an underground stream which receives combined sewer overflows and direct waste discharges. This portion is treated as a point discharge to the Blackstone River in the comparison of water quality impacts of the waste discharges. Insufficient data exists to fully evaluate the upper portion.

TABLE 1

BLACKSTONE RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Kettle Brook	Kettle Brook Reservoirs	Above 61.0	5.0	A	A
2	Kettle Brook	From last reservoir to Waite Pond outlet	61.0-59.3	1.7	B	B
3	Kettle Brook	From Waite Pond outlet to Curtis Pond outlet	59.3-51.3	8.0	U	C
4	Middle River	From Curtis Pond outlet to American Steel Dam	51.3-48.8	2.5	U	C
5	Blackstone River	From American Steel Dam to Worcester STP	48.8-46.6	2.2	U	C
6	Blackstone River	From Worcester STP to Millbury STP	46.6-42.8	3.8	U	C1
7	Blackstone River	From Millbury STP to Fisherville Pond	42.8-40.0	2.8	U	C1
8	Blackstone River	From Fisherville Pond to Grafton STP	40.0-38.8	1.2	U	C
9	Blackstone River	From Grafton STP to Northbridge STP	38.8-32.4	6.4	U	C
10	Blackstone River	Northbridge STP to Mumford River	32.4-29.5	2.9	U	C
11	Blackstone River	Mumford River to West River	29.5-28.7	0.8	U	C
12	Blackstone River	West River to state line	28.7-20.0	8.7	U	C
13	Quinsigamond River	Entire length	5.3-0.0	5.3	C	B
14	Mumford River	Above East Douglas	above 9.0	5.5	B	B

TABLE 1 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
15	Mumford River	East Douglas to Blackstone River	9.0-0.0	9.0	C	B
16	West River	Entire length	16.0-0.0	16.0	B	B
17	Mill River	Entire length	--	11.0	C	B
18	Peters River	Entire length	--	7.5	B	B
19	Beaver Brook	Entire length	--	2.0	U	B
20	Mill Brook	Entire length (including Weasel Brook)	--	4.5	U	B

Total Miles of Class A - 5.0
Total Miles of Class B - 30.7
Total Miles of Class C - 25.3
Total Miles of Unsatisfactory Conditions - 45.8

BOSTON HARBOR

Present Conditions

MYSTIC RIVER:

Segment 1 - Aberjona River from Headwaters to Hall's Brook - Intermittent nutrient and coliform bacteria problems are the result of a surcharging sewer line near the headwaters in Reading. Dissolved oxygen concentrations are frequently below 5.0 mg/1.

Segment 2 - Aberjona River from Hall's Brook to Mishawum Road Bridge - Extremely high ammonia-nitrogen concentrations are caused by industrial waste discharged by the National Polychemicals Company (now a Division of the Stepan Corporation). This discharge is no longer active, but the prior discharge site is permeated with the waste material which now continues to enter the Aberjona River via Hall's Brook through the surface and groundwaters. Dissolved oxygen concentrations are again often found below 5.0 mg/1 coliform bacteria concentrations are in violation of Class "B" standards.

Segment 3 - Aberjona River from Mishawum Road Bridge to Inlet of Burbank Pond - Similar problems as Segment 2 with more depressed dissolved oxygen concentrations.

Segment 4 - Aberjona River from Inlet to Outlet of Burbank Pond - Similar problems as Segments 2 and 3 with a slight improvement in the dissolved oxygen concentrations due to increased reaeration.

Segment 5 - Aberjona River from the Outlet of Burbank Pond to Sweetwater Brook - A continued improvement in the dissolved oxygen concentrations but still below Class "B" standards for much of the time. Ammonia-nitrogen concentrations remain at levels which are considered toxic to most aquatic organisms. Nitrate-nitrogen and total phosphorus also remain in high concentrations. Coliform bacteria are again sufficiently high in concentration to violate Class "B" standards.

Segment 6 - Aberjona River from Sweetwater Brook to the Inlet of Pond 4 - Sweetwater Brook receives periodic sewage flows from two combined sewer overflows in Stoneham. Coliform bacteria concentrations increase as a result, but the dissolved oxygen levels continue to recover due to increased reaeration. Near the end of the segment, the Aberjona River receives an uncontaminated cooling water discharge from the J.H. Winn Company.

Segment 7 - Aberjona River from Inlet of Pond 4 to Horn Pond Brook - Dissolved oxygen levels throughout this segment are extremely depressed due to low reaeration and relatively long travel time through Pond 4. Coliform bacteria concentrations remain high as well as nutrients. There is an uncontaminated cooling water discharge from the Parkview Apartments near the middle of the segment.

Segment 8 - Aberjona River from Horn Pond Brook to the Inlet of Upper Mystic Lake - Dissolved oxygen concentrations increase, nutrient concentrations decline as the river flows through a number of small impoundment in Winchester Center and experiences a high degree of phososynthetic activity. Coliform bacteria concentrations remain high thus preventing the river from meeting standards.

Segment 9 - Upper Mystic Lake, Inlet to Outlet - High nutrient concentrations, particularly ammonia-nitrogen are found as well as severe dissolved oxygen problems in the lower depths during the summer months which prevent the lake from supporting virtually any aquatic life. While the lake is suitable for swimming at the MDC operated sandy beach, it cannot be considered to be of Class "B" quality due to the above stated reasons.

Segment 10 - Lower Mystic Lake, Inlet to Outlet - Even more severe problems are found in the Lower Mystic Lake which largely are the result of an anaerobic, trapped bottom layer of salt water. This bottom layer, having a higher density gradient than the overlying waters does not readily mix with them during the spring and fall turnovers. It tends to act as a nutrient sink as algae populations die, settle out and decompose in these stagnant waters. Hydrogen sulfide concentrations are extremely high and are a nuisance when this anaerobic layer becomes disturbed. For these reasons, the Lower Mystic Lake must be considered in violation of Class "B" standards.

Segment 11 - Mystic River from the Outlet of Lower Mystic Lake to Alewife Brook - This segment meets Class "C" standards but is subject to stormwater runoff from a number of moderately sized storm drains.

Segment 12 - Mystic River from Alewife Brook to the Amelia Earhart Dam - Alewife Brook becomes an open sewer during any appreciable precipitation due to the large number of combined sewer overflows from the cities of Cambridge and Somerville. The Mystic River itself also receives discharges of sewage from combined sewer overflows and many large stormwater discharges. The river is grossly polluted throughout this segment and considered to be of less than "C" quality.

Segment 2T - Malden River, Entire Length - The Malden River is subject to small amounts of sewage from combined sewer overflows and large volumes of stormwater which prevent it from meeting Class "C" standards. It is more a tidal estuary than a river and thus rather stagnant due to the low flows generated in the basin.

Segment 1T - Alewife Brook, Entire Length - Large volumes of raw sewage and stormwater which are discharged to the Brook during and following precipitation account for its problems.

NEPONSET RIVER:

Segment 1 - Neponset River Dam to Outlet, Crackrock Pond - Foxboro Reservoir is a shallow pond (average depth is 6 ft.). Dissolved oxygen levels are relatively high but decrease as the summer progresses. This is likely due to algal growth supported by high temperatures and the availability of phosphorus and ammonia-nitrogen. The combination of these factors points out the reasons that the pond is considered eutrophic. Coliform counts in July 1973 (300/100 ml) are well within the Class "B" limit.

Segment 2 - Crackrock Pond Dam to Summer Street Dam, Walpole - Crackrock Pond is also a eutrophic impoundment comprised of marshy land overrun with aquatic plant life. The discharge from Foxboro State Hospital effects the water quality of this segment and its contribution of nutrients is likely accountable for the high levels of weed growth. During the 1973 survey dissolved oxygen levels averaged 6.3 mg/1 and B.O.D. was reported as 3.1 mg/1 (DWPC, Part C, 1973).

Segment 3 - Summer Street Dam to Above Bird Machine Diversion Dam - This segment consist primarily of the water immediately above and below the Summer Street Dam. Coliform counts are much higher than those in previous segments signifying the introduction of organic wastes (probably from Foxboro Raceway). Both the levels of phosphorus and algae were found to be lower in this segment.

Segment 4 - Above Bird Machine Diversion Dam to Above Kendall Mills South Street Plant Dam - Dissolved oxygen concentrations are higher attributable to the effect of Summer Street and Diversion Dams. Here again, an algal bloom was reported signifying the continuing high nutrient levels.

Segment 5 - Above Kendall Mills Dam to Main Plant Dam - Fairly turbulent flow results from dams upstream with oxygen levels showing an increasing trend. Levels of B.O.D. have decreased over past years due to the elimination of various discharges.

Segment 6 - Kendall Mills Main Plant to Outlet, Stetson Pond Dam - Water quality here is degraded by the plant's untreated waste discharge, urban runoff containing bacteria, and oil and grease which was traced to the Kendall Plant.

Segment 7 - Outlet Stetson Pond Dam to Outlet Bird Pond Dam - A slight increase in D.O. levels occurs within this segment. Also B.O.D. levels are low reflecting a general improvement in water quality.

Segment 8 - Outlet Bird Pond Dam to USGS Gage, Norwood - Between sampling stations in this and the previous segment, the river gradient drops considerably. Increased turbulence raises D.O. levels. Also the flow from Hawes Brook helps bring D.O. levels higher. No algal or B.O.D. problems were encountered in this segment.

Segment 9 - USGS Gage, Norwood to Confluence with East Branch - At this point the river enters Fowl Meadow Marsh where flows are impounded. Wastes present are not stablized due to the low rate of reaeration. Oxygen in stream averages about 5 mg/l through the marsh (see Segment 10 and 11).

Segment 10 - Confluence of East Branch to Truman Highway Bridge - Low flows, benthal demand and low assimilative capacity of the river cause a further reduction in D.O. levels. However, these levels do not get critically low.

Segment 11 - Truman Highway Bridge to Confluence with Mother Brook - In this segment, combined sewer overflows, urban runoff, and other non-point pollutants become the primary problems of the Neponset River. Ammonia-nitrogen, B.O.D., and coliform levels are all raised.

Segment 12 - Confluence, Mother Brook to Hollingsworth and Vose Dam - This segment exibits much the same water quality conditions as Segment 13. Dissolved oxygen concentrations increase with the passage of water over the MDC Dam at Tileston and Hollingsworth.

Segment 13 - Hollingsworth and Vose Dam to Diamond International Dam - Dissolved oxygen concentrations are slightly depressed. Benthic organisms impose an oxygen demand with the attendant decrease in D.O.

Segment 14 - Diamond International Dam to Milton Lower Falls Dam - After this impoundment, the river ceases to be totally freshwater and becomes estuarian. Again a benthic demand occurs behind the dam. Slightly depressed D.O. levels are found in this segment.

TABLE 2

BOSTON HARBOR

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Aberjona River (19a)	To Hall's Brook	18.4-15.1	3.3	C	B
2	Aberjona River	Hall's Brook to Mishawum Road Bridge	15.1-14.8	0.3	U	B
3	Aberjona River	Mishawum Road Bridge to Inlet, Burbank Pond	14.8-13.5	1.3	U	B
4	Aberjona River	Inlet to outlet, Burbank Pond	13.5-13.3	0.2	U	B
5	Aberjona River	Outlet, Burbank Pond to Sweetwater Brook	13.3-12.0	1.3	U	B
6	Aberjona River	Sweetwater Brook to inlet, Pond 4	12.0-11.6	0.4	U	B
7	Aberjona River	Pond 4 to Horn Pond Brook	11.6-10.3	1.3	U	B
8	Aberjona River	Horn Pond Brook to inlet, Mystic Lake	10.3-9.2	1.1	U	B
9	Upper Mystic Lake	Inlet to outlet	9.2-8.1	1.1	C	B
10	Lower Mystic Lake	Outlet, Upper Mystic Lake to outlet, Lower Mystic Lake	8.1-7.4	0.7	U	B
11	Mystic River	Outlet, Lower Mystic Lake to Alewife Brook	7.4-6.5	0.9	C	C
12	Mystic River	Alewife Brook to Earhart Dam	6.5-2.0	4.5	U	C
2T	Malden River	Entire length	1.9-0.0	1.9	U	C
1T	Alewife Brook	Entire length	--	2.0	U	C
0	Neponset River (19c)	Above Neponset Reservoir Dam	Above 29.5	--	C	B

TABLE 2 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Neponset River	Neponset Reservoir Dam to outlet, Crackrock Pond Dam	29.5-28.95	0.60	C	B
2	Neponset River	Crackrock Pond Dam to Summer Street Dam, Walpole	28.95-27.33	1.62	C	B
3	Neponset River	Summer St. Dam to above Bird Machine Co. diversion dam	27.33-27.15	0.18	C	B
4	Neponset River	Above diversion dam to above Kendall Mills South Street plant dam	27.15-24.25	2.90	C	B
5	Neponset River	Above Kendall Mills South Street dam to main plant dam	24.25-23.47	0.78	C	B
6	Neponset River	Kendall Mills main plant dam to outlet, Stetson Pond Dam	23.47-22.62	0.85	C	B
7	Neponset River	Outlet, Stetson Pond Dam to outlet, Bird Pond Dam	22.62-20.75	1.87	C	B
8	Neponset River	Outlet, Bird Pond Dam to USGS, Pleasant Street, Norwood	20.75-19.2	1.55	U	C*
9	Neponset River	USGS, Norwood, to confluence with East Branch	19.2-15.8	3.40	U	C
10	Neponset River	Confluence with East Branch to Truman Highway bridge	15.8-8.9	6.90	C	C
11	Neponset River	Truman Highway bridge to confluence with Mother Brook	8.9-7.9	1.00	U	C

* Bird and Sons, Inc. has completed recycling system which has reduced total discharge; cleaning of river banks has reduced runoff and seepage of oil to river. This segment may now be meeting standards; unable to determine until resurveyed.

TABLE 2 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
12	Neponset River	Confluence, Mother Brook to Hollingsworth and Vose Dam	7.9-7.0	0.90	U	C
13	Neponset River	Hollingsworth and Vose Dam to Diamond International Dam	7.0-4.53	2.47	U	C
14	Neponset River	Diamond International Dam to Milton Lower Falls Dam	4.53-4.2	0.33	U	C

Total Miles of Class C - 21.0
Total Miles of Unsatisfactory Conditions - 24.65

BUZZARDS BAY BASIN

Present Conditions

Segment 1 - Buttermilk Bay - Buttermilk Bay is located on the northern shore of the southern entrance to the Cape Cod Canal. It would, therefore, be subject to the effects of wastewater discharges to the canal, dependent upon the tides. There are no known major point discharges of wastewater to Buttermilk Bay. The 1975 Buzzards Bay survey had one station on Miller Cove, MC1, which forms a portion of Buttermilk Bay. The survey results indicate the water to be of excellent quality. The surrounding area is heavily developed, however, and is not sewered; thus there is the possibility of localized water quality problems from failing septic systems. At the time of sampling, what would be considered excessive amounts of algae were apparent, indicating that nutrient-rich waters, likely a result of failing septic systems, were present. Unfortunately, the restrictions on laboratory personnel and equipment did not permit a microscopic analysis of this sampling station.

The Cape Cod Canal receives wastewater discharges from the Canal Electric Company (primarily cooling water), Massachusetts Maritime Academy, Canalview Apartments, and a Coca-Cola plant. No effect from these discharges is likely in Buttermilk Bay or any other area of Buzzards Bay, due simply to dilution of the wastewater.

There is heavy oil-tanker traffic through the Cape Cod Canal, and the possibility of a serious oil spill is always present. Oil pollution of a minor nature results from the high concentration of pleasure craft in these waters, especially during the summer months. More importantly, discharges of untreated sanitary wastes from the larger watercraft create localized water quality problems, thus endangering the usage of these waters for shellfishing and swimming. Presently, there are no areas of Buttermilk Bay closed to shellfishing.

Segment 2 - Onset Bay - Onset Bay is to the immediate west of Buttermilk Bay and is similar in most respects. It receives no known point discharges of wastewater. The 1975 Buzzards Bay survey had one station (ER1) at the mouth of the East River which forms a small cove in Onset Bay. The sampling results show that, in general, this water is of the highest quality. Again, as is the case of Buttermilk Bay, it is impossible to fully assess the water quality of Onset Bay from the results of one sampling station. The surrounding area is not sewered and is intensively developed. Sampling of a more specific nature would be necessary to determine whether septic tank leachate is a problem in localized areas.[1] Onset Bay supports heavy recreational boating during the summer months and, therefore, discharges of sanitary wastes from watercraft are likely. Oil pollution from pleasure craft and, more importantly, from offshore oil tanker traffic is always possible.

With the exception of Muddy Cove, Onset Bay is open to shellfishing. Muddy Cove has not been closed for reasons of lowered water quality but for the purpose of oyster propagation.

Segment 3 - Agawam River, headwaters to Wareham STP discharge - The 1975 Buzzards Bay survey had four sampling stations on the Agawam River. Station AG1 was located at the outlet of Halfway Pond in Plymouth, which is the origin of the Agawam River. There are no known sources of pollution to the

[1]Results of storm drain sampling by the Division's Southeast Regional Office on coastal portions of the Wareham River indicate that septic tank leachate is a problem common to intensely developed coastal areas.

Agawam River above this point; therefore, AG1 was chosen as a clean water station against which comparisons could be made with data collected from downstream stations.

The sampling results show the Agawam River to be well within Class B requirements at Station AG1. Nutrient levels were consistently low and, as would be expected, microscopic analyses found algal concentrations also low. A microscopic analysis was possible for the July survey only; therefore, the actual algal population in August is unknown. The nutrient levels remained low for both months and were insufficient to support any algal "blooms." Although the water temperatures recorded during the August surveys were lower than those of the July surveys, overall higher temperatures during the month of August likely resulted in an increased biomass concentration at that time. The BOD_5 in July averaged 1.7 mg/1, which is indicative of clean water; while in August it jumped to an average of 4.4 mg/1. The COD averaged 14 mg/1 in July and 16 mg/1 in August, indicating only minor additional inputs of organic material. The demand exerted by the algae through respiration and decay is believed to be reflected in the higher BOD_5 levels found in August.

Station AG2 was located 5.2 miles downstream at the outlet of Glen Charlie Pond in Wareham. There are no known point discharges of wastewater to the Agawam River between these stations, and the sampling results from AG2 indicated this. The nutrient levels remained consistently low; but, as noted at Station AG1, the BOD_5 level increased from 1.8 mg/1 in July to 4.9 mg/1 in August. This is again believed to be attributable to the increased algal population in August.

Station AG3 was located 2.0 miles downstream from Station AG2 at the outlet of Mill Pond on Route 28 in Wareham. Shortly below this point, the Agawam River becomes tidally influenced. The water quality of the Agawam River at Station AG3 was nearly identical to that found at Station AG2 and well within Class B requirements.

Segment 3a - Agawam River, Wareham STP discharge to river mouth - Sampling Station AG4 was located 1.2 miles downstream of AG3 on Route 6 in Wareham. This point is shortly downstream of the discharge from Wareham's municipal wastewater treatment plant.

As expected, increases in nutrient levels were found which can be attributed to the treatment plant. The Wareham facility is of extended aeration design and uses sand beds to polish the effluent prior to discharge to the river. The survey results indicated that, other than slightly increased nutrient concentrations which are still considered well within Class B criteria, this highly treated discharge has little impact on the quality of the Agawam River. The following charts contrast the quality of the Agawam River before (AG3) and after (AG4) the point of discharge for the July and August surveys. (Units are expressed in mg/1 unless otherwise noted.)

	BOD_5	NH_3	NO_3	TOTAL P	TOTAL COLIFORM/100 m
		JULY			
AG3	1.6	0.02	0.0	0.02	14
AG4	1.3	0.06	0.1	0.06	55
		AUGUST			
AG3	4.2	0.02	0.0	0.01	39
AG4	4.2	0.09	0.1	0.02	950

Again, the higher BOD_5 values in August are believed due to the increased algal population. The presence of algae in August is also indicated by a more pronounced diurnal fluctuation in dissolved oxygen values noted at all sampling stations due to increased photosynthesis during August.

The dissolved oxygen data collected from all four sampling stations show the Agawam River in general was well above the 5.0 mg/1 minimum allowable Class B requirement.

At Station AG4, wide fluctuations in the dissolved oxygen values were found, probably caused by the higher nutrient levels and resultant algal population. Minimum dissolved oxygen concentrations at times approached the 5.0 mg/1 minimum allowable concentration, but only once during either survey was there a violation (4.7 mg/1). This is not considered a problem at the present time, but it indicates that increased flows from the Wareham treatment plant in the future could result in dissolved oxygen problems downstream.

Segment 4 - Wankinco River - The Wankinco River Basin is to the west and adjacent to the Agawam River Basin. The two rivers converge near Wareham Center to form the Wareham River. Like the Agawam River, large wetland areas form much of the Wankinco's drainage basin and numerous impoundments are found along the main stem. The Tremont Nail Company discharges cooling water and wastes from a pickling operation to the Wankinco River. This discharge and two sanitary landfills near the river's course largely determined the placement of the sampling stations.

Near the headwaters of the Wankinco River, a regional landfill site serving the communities of Wareham, Carver, and Marion is located. Station W01 was located above this site on the Wankinco River in Carver at mile point 4.5. There are no known sources of pollution above this point; therefore, Station W01 is considered a "clean water" station.

Because the nature of the watersheds is similar, the water quality of the Wankinco River approximates that of the Agawam River. Nutrient levels were very low for both the July and August surveys. As observed on the Agawam River, the BOD5 levels jumped, from an average of 1.3 mg/1 in July to 4.2 mg/1 in August. The diurnal fluctuation in dissolved oxygen concentrations increased also and here again, the higher BOD5 values in August are due to the effects of algae.

Total coliform bacteria were consistently found in concentrations slightly in violation of Class B standards at Station W01. The source is unknown and further investigation is required. All other parameters were well within the standards, indicating that the unknown source of pollution is minor in nature.

Station W02 was located slightly downstream of the regional landfill site, on the Wankinco River in Carver. The regional landfill has been in operation a relatively short period of time; consequently, the sampling results showed it had no effect on the water quality of the Wankinco River. These data will be useful in assessing any effects this landfill may have on the river in the future.

Station W03 was located on the Wankinco River in Wareham, immediately downstream of the discharge from the Tremont Nail Company. The original intent of this sampling site was to assess the effects of the waste discharge from the Tremont Nail Company. Also of importance were any possible impacts the former Wareham landfill site, located shortly upstream, had on the Wankinco River. Unfamiliarity with the discharge point from the Tremont Nail Company resulted in the effects of this discharge being missed entirely at W03. It would have been difficult, however, to separate the impacts of the sources, had both been present at Station W03.

The former Wareham landfill is no longer in use and has been covered. It has not been capped, however, and the bare soil will likely in time allow the build-up of a groundwater dome due to the high infiltration rate. This, in turn, will increase the possibility of leachate from the landfill entering the Wankinco. Phosphorus and COD at W03 indicate that possibly some leachate is presently entering the Wankinco River from the landfill. Another possible source is the regional septage handling lagoons which are located to the west of the Wankinco River. Despite the increases in pollutant levels, the Wankinco River at Station W03 is still of Class B quality.

Dissolved oxygen values were generally well above the 5.0 mg/l minimum allowable for Class B waters at all three stations. There was little diurnal fluctuation in dissolved oxygen concentrations, which can be attributed to the small algal population which, in turn, resulted from the lack of nutrients.

Segment 5 - Wareham River - Approximately four-tenths of a mile downstream from Station W03, the Wareham River is formed by the confluence of the Agawam and Wankinco Rivers. Station WM1 was located one-tenth of a mile downstream from this confluence. The Wareham River is 2.6 miles long and tidally influenced its entire length.

As expected, the results from Station WM1 showed the Wareham River at this point to be of the same quality as the rivers forming it.

Wareham Center is located upstream of Station WM1 on the western bank of the Wankinco River. Any effects of stormwater runoff from Wareham Center on downstream waters are difficult to assess due to the lack of any appreciable precipitation during any of the sampling periods.

As would be expected, fluctuations in the BOD_5 results were similar to those in the Wankinco and Agawam Rivers from July to August with averages of 1.5 mg/l and 4.2 mg/l found in those months, respectively. This is again believed due to the increased algal population in August and the decreased flow which acted to concentrate the pollutants.

The most noticeable change in water quality at WM1 is the increase in ammonia-nitrogen. Concentrations of ammonia-nitrogen were never found in excess of 0.09 mg/l in the Agawam or Wankinco Rivers; while at WM1, ammonia-nitrogen averaged 0.18 mg/l in July and 0.32 mg/l in August. A clean-water ocean sampling station on Aucoot Cove indicates that these levels of ammonia-nitrogen are not due to any single pollution source, but are merely background levels found in Buzzards Bay.

Station BM1 was located 0.9 miles downstream of Station WM1 at the mouth of the Broad Marsh River, a tidal estuary of the Wareham River. The results from BM1 indicate the Broad Marsh River is of approximately the same quality as the Wareham River. On the basis of the results from stations WM1 and BM1, these waters are meeting their Class SA requirements. The coliform bacteria levels found were usually under 700/100 ml, which is the median level allowable for SA waters. Previously, there were high coliform bacteria concentrations in the upper reaches of the Broad Marsh River which were due to leachate from failing septic systems. For this reason, the Massachusetts Department of Environmental Quality Engineering, Division of Water Supply, had closed 38 acres of the Broad Marsh River to shellfishing. This area has since been sewered to the Wareham wastewater treatment plant, which has improved the water quality sufficiently to again permit shellfishing.

A minimum dissolved oxygen concentration of 5.8 mg/l was recorded at Station WM1, which is in violation of the 6.5 mg/l minimum allowable for SA waters. The average concentrations for July and August were 7.3 and 7.4 mg/l, respectively,at Station WM1. Minimum D.O. concentrations of 8.2 and 8.5 mg/l at BM1 indicate that, shortly downstream of WM1, low dissolved oxygen concentrations are not a problem. Therefore, the minimum D.O. values recorded at Station WM1 are not sufficient to consider the Wareham River in violation of its classification. It should be noted that the 6.5 mg/l minimum D.O. requirement for Class SA waters is unrealistic, considering that the high water temperatures recorded during the surveys acted to decrease the saturation value to approximately 7.3 mg/l in saltwater (15,000 mg/l chlorides, $75^{o}F$).

During the summer months the Wareham River supports heavy recreational boating. It is likely that, at these times, untreated sanitary discharges from the watercraft produce localized areas of lower water quality.

Oil spills on the Wareham River from fuel oil dealers in Wareham Center have been a problem in the past and likely will continue to be so in the future. Like Buttermilk and Onset Bays, the Wareham River is also subject to oil spills from offshore oil tanker traffic.

The Division's Southeast Regional Office (SERO) conducted sampling on September 28, 1976, of storm drains in the areas of Pinehurst Beach, Swift's Beach, and Pine Point, which are coastal areas of the Wareham River. The results indicate that septic tank leachate is a serious problem to the river. Therefore, despite the results from the 1975 survey which indicate that few water

quality problems exist, the Wareham River is considered to be of SB quality based on SERO's sampling results and problems which are known to occur periodically due to the above-cited sources.

Segment 6 - Weweantic River - above outlet of Horseshoe Pond - The Weweantic River Basin lies to the west of the Wankinco River Basin and is similar in nature. Much of the drainage area consists of wetlands, and numerous cranberry bogs are scattered throughout the basin. The intensive use of this basin by the cranberry industry has made the Weweantic River well known for its pesticide pollution problems. This is a problem shared in all the basins in the eastern portion of Buzzards Bay; but due to a number of large fish kills on the Weweantic River, studies have centered in this area. The Weweantic has been considered as a possible water supply by area communities; thus, its water quality is of great importance.

There are no known direct discharges of wastewater to the Weweantic River. Within the drainage basin are found three landfill sites, two of which are no longer in use. The remaining active site is well situated and there appear to be no important runoff or leachate problems with this or the other landfill sites.

The sampling points on the Weweantic River were chosen rather randomly due to the fact that no pollution sources were known to exist (other than the previously mentioned pesticides).

Station WE1, the most upstream sampling point, was located on Rochester Road on the Middleborough-Carver line, at river mile 12.1. The sampling results indicate that there are no major water quality problems resulting from the two former landfill sites located upstream.

During the July survey, the dissolved oxygen concentration averaged 3.3 mg/1 while in August it averaged 5.9 mg/1. A few days before the July survey, it rained on the order of one to two inches, while the days before the August survey were relatively dry. The flow recorded at Station WE1 in July was approximately triple the August flow. It appears that the precipitation before the July survey acted to flush out the wetland areas. This water is naturally stagnant and characteristically low in dissolved oxygen content. The higher color values found in July also indicate that wetland waters were the source of the low dissolved oxygen values.

As observed in the neighboring river basins, the BOD_5 values increased from July to August, while the COD values remained relatively constant. The BOD_5 averaged 1.3 mg/1 and 4.2 mg/1 in July and August, respectively. This increase is due to the effects of a larger algal population in August. The COD values averaged 36 mg/1 in July and 34 mg/1 in August, indicating that the concentration of organics varied little.

Ammonia- and nitrate-nitrogen were found in very low levels or were nonexistent for both months. During the July survey, the total phosphorus averaged 0.10 mg/1, somewhat higher than expected; while in August an average of 0.04 mg/1 was recorded. The higher July values are likely due to the flushing of wetland areas from the heavy precipitation.

The total coliform bacteria concentrations averaged 200/100 ml and 350/100 ml for July and August, respectively, which are well within Class B criteria.

The dissolved oxygen concentrations below the minimum allowable 5 mg/l for a Class B stream are due to natural stream conditions. For this reason the Weweantic River is considered as meeting Class B criteria at Station WE1.

Station WE2 was located 4.1 miles downstream at Route 28, Wareham. The water quality at this station is nearly identical in all respects to that observed at WE1. One exception is the dissolved oxygen concentration, which averaged 4.7 mg/l in July. The increase from Station WE1 to WE2 is due to stream reaeration.

Station WE3 was located on Squire Island Road in Wareham, 2.8 miles downstream from Station WE2. Again, water quality here was identical to that observed at WE1 and WE2. The dissolved oxygen concentrations showed continued recovery, with a minimum of 6.1 mg/l and an average of 7.1 mg/l in July.

The Weweantic River has been designated a Class B stream by the Division from its headwaters to the outlet of Horseshoe Pond. The results from sampling stations WE1, WE2, and WE3 indicate the water quality of the Weweantic River to be within Class B criteria.

Segment 7 - Weweantic River - outlet of Horseshoe Pond to river mouth - Downstream of the outlet of Horseshoe Pond, the Weweantic River becomes tidal. From the outlet of Horseshoe Pond to the mouth, the river has been assigned an SA classification by the Division.

The final station on the Weweantic River was located on Route 6 on the Marion-Wareham line. This point is downstream of the confluence with the Sippican River and is 2.1 miles upstream of the mouth of the Weweantic River. The Weweantic is dominated by the tides at WE4; therefore, high and low tide samples were collected to observe the extremes of dilution.

Actually, little difference was noted between the high and low tide sampling results. The ammonia-nitrogen concentration was noticeably higher for the high tide samples, which is due to the background concentration found in Buzzards Bay. Likewise, the total phosphorus concentration increased to background levels.

Dissolved oxygen concentrations for both the July and August surveys were generally above the 6.5 mg/l minimum allowable for SA waters. The total coliform bacteria concentrations were at all times well within Class SA requirements at Station WE4. The Weweantic River is open to shellfishing and, on the basis of the results from Station WE4, is meeting Class SA criteria.

Segment 8 - Sippican River - above County Road - The Sippican River is tributary to the Weweantic River from the west at river mile 2.2. Its watershed is similar to that of the Weweantic River and, as expected, the sampling results are also similar.

Station SIR1 was located at Pierceville Road in Rochester at river mile 6.8. There are no known sources of pollution to the Sippican River other than the previously mentioned pesticides problem common to all rivers in this portion of Buzzards Bay.

The dissolved oxygen concentrations at Station SIR1 for both the July and August surveys consistently violated the 5.0 mg/1 minimum allowable concentration for Class B waters.

As noted on the Weweantic River, the BOD_5 values differed for July and August. In July, the BOD_5 averaged 1.4 mg/1; in August, it averaged 4.3 mg/1. The increase in five-day BOD in August is interesting since the COD actually decreased from an average of 40 mg/1 in July to 25 mg/1 in August. Thus, the increase in BOD_5 is attributed to the effect of algae on the BOD test.

It is obvious from the COD results that the low dissolved oxygen concentrations are not due to the demand exerted by large amounts of organic material. Rather, these values are believed due to the naturally occurring low dissolved oxygen content found in wetland waters and the sluggish nature of the Sippican River. For this reason, the low dissolved oxygen values are not considered in violation of Class B criteria.

The nutrient levels at SIR1 are typical of those found on the Weweantic River. Ammonia-nitrogen averaged 0.04 mg/1 for both months, while no nitrate-nitrogen was found during either survey. The total phosphorus averaged 0.08 mg/1 in July and dropped to 0.02 mg/1 in August. The higher values in July are due to the heavy precipitation prior to sampling which tended to flush the wetlands.

Segment 9 - Sippican River, County Road to river mouth - Station SIR2 was located 4.7 miles downstream from SIR1, at river mile 2.1. The Sippican River is still freshwater at this point but becomes tidally influenced a short distance downstream. A recovery in the D.O. concentrations was observed at SIR2, with a minimum D.O. of 4.3 mg/1 recorded in July and 5.0 mg/1 in August.

The nutrient concentrations at SIR2 were comparable to those found at SIR1 except for the appearance of 0.2 to 0.3 mg/1 of nitrate-nitrogen during both surveys. The BOD_5 values varied as previously noted at Station SIR1.

The total coliform bacteria concentrations found at SIR2 were slightly in violation of Class SA criteria for both surveys. This portion of the Sippican River is, therefore, considered to be of SB quality. The source of the bacteria is unknown, but the Sippican River, despite this, poses minimal pollution problems to the Weweantic River.

Segment 10 - Sippican Harbor - Sippican Harbor has been classified as an SA body of water by the Division. All but a small portion of the harbor is presently of SA quality and is, therefore, open to shellfishing. A

small cove at the head of the harbor has been closed to shellfishing due to high concentrations of mercury. The Massachusetts Department of Environmental Quality Engineering has identified the source as mercury-based antifoulant paints used on the hulls of racing craft.

Sampling was conducted at three stations within the harbor during the July survey at low tide. The sampling program was expanded during the August survey to include both high and low tide samples. Where depths exceeded approximately three feet, both top and bottom samples were collected for chemical and bacteriological analysis.

The sampling results from all three stations indicate that there was little difference between top and bottom, or high and low tide samples. Sippican Harbor is relatively long and narrow, but there are no restrictions at its mouth to prevent complete mixing of the water column at all times.

One of the most important criteria in evaluating the quality of SA waters open to shellfishing is the concentration of coliform bacteria. In general, the total coliform bacteria concentrations found during both surveys were extremely low, with most counts less than 10 coliform/100 ml.

Sippican Harbor is used extensively for recreational boating purposes during the summer months. There is a significant increase in the amount of organic material in the harbor on weekdays which is reflected in the higher BOD_5 results from Tuesday's samples. This increase in organics can be attributed to the large numbers of pleasure craft with onboard sanitation facilities which are moored in the harbor and to the use of these facilities on weekends. Thursday's samples indicated that, during the week, the organic loading is minimal and the harbor flushes itself.

The BOD_5 results showed the same trend during the August survey but were overall considerably higher. This is probably due to the continued discharge of sanitary wastes from pleasure craft and the resultant accumulation of organic material. In August, it is likely that an increased algal population would tend to produce higher BOD_5 results.

During the August survey, the amount of suspended solids increased noticeably at all three sampling station, further indicating a high degree of organic material present. This increase in organics could also be attributed to water-contact recreational activities which would tend to suspend bottom matter.

In a freshwater environment, discharges of sanitary wastes would be indicated by high counts of coliform bacteria in addition to an increase in the BOD_5 values. This is not the case, however, in a saltwater environment. Coliform bacteria die off rapidly when exposed to high salinity and intense sunlight. During the Buzzards Bay surveys, weather conditions were favorable for long hours of sunlight. This, in addition to the high salinity, produced the low coliform bacteria concentrations observed at the open-ocean "clean water" stations in Buzzards Bay.

The nutrient concentrations found at stations SIH1, 2, and 3 were representative of the background concentrations observed at the open-ocean "clean water" stations in Buzzards Bay.

Segment 11 - Aucoot Cove - Aucoot Cove is the receiving water for the secondary treated effluent from Marion's wastewater treatment plant. There are no other known wastewater discharges to Aucoot Cove, but problems from septic tank leachate are known to exist, primarily in the Hiller Cove, Harbor Beach area of Mattapoisett.

Two sampling stations were located in Aucoot Cove. Station AC1 was a "clean water" station at the mouth of the cove. Its purpose was to provide a point of reference against which the results from other tidal sampling stations could be compared.

The effluent from Marion's treatment facility is discharged to a small stream which enters the head of Aucoot Cove. Sampling station AC2 was located in the vicinity of the mouth of the stream with the intent of assessing the water quality impact of Marion's discharge. To maintain the quality of the shellfishing flats of Aucoot Cove, this discharge is lagooned during the summer months; thus, it proved impossible to assess its impact at this time.

The results from both stations indicate that Aucoot Cove is a high-quality shellfishing area that is well within its Class SA requirements.

Segment 12 - Mattapoisett River - The Division has classified the Mattapoisett River as a Class B stream. Its water quality is of special interest due to the municipal well fields near its course which serve the communities of Fairhaven and Mattapoisett. There are no known sources of either point or non-point pollution to the Mattapoisett River.

Sampling station MA1 was located at river mile 9.5 on the Snipatuit Road. This site is a short distance downstream from the outlet of Snipatuit Pond, which forms the headwaters of the Mattapoisett River.

The BOD_5 results averaged 1.2 mg/l in July and 2.2 mg/l in August, which are indicative of high quality water. The nutrient levels were likewise relatively low for both months.

Dissolved oxygen concentrations were often found below the 5.0 mg/l minimum allowable for Class B waters. The flow at Station MA1, which was extremely low for both surveys, was comprised mainly of leakage through an outlet structure of an impoundment located immediately upstream. This produced near-stagnant conditions and thus little reaeration. A pronounced fluctuation in the dissolved oxygen concentration due to photosynthesis produced values during the early morning hours as low as 0.4 mg/l.

At sampling station MA2, river mile 3.8, the Mattapoisett River is meeting Class B requirements, but there are increases in the COD, BOD_5, and nutrient values. This is probably due to an input of organic material from the large wetland areas within the watershed. Minimum D.O. concentrations of 4.2 mg/l in July and August were recorded, with averages of 4.9 and 5.9 mg/l, respectively.

Station MA3, at river mile 1.7, was the final sampling station on the Mattapoisett River. Shortly downstream of this point, the river becomes tidal and then discharges to Mattapoisett Harbor.

Between stations MA2 and MA3, no significant change in water quality occurs other than the dissolved oxygen concentrations which continued to recover, with minimum values of 4.4 mg/l in July and 5.1 mg/l in August.

The coliform bacteria concentrations at stations MA1 and MA2 were generally within Class B requirements. On August 26, 1200 coliform/100 ml were recorded at MA1; while on July 15, 2700 coliform/100 ml were found at MA2. These counts are not sufficient cause to consider the Mattapoisett River in violation of its B classification, but they do indicate the possibility of minor unknown sources of pollution.

The low dissolved oxygen concentrations found at all three sampling stations are due to the characteristically low D.O. content of wetland waters which comprise much of the river's total flow and to the sluggish nature of the river itself. Because the low D.O. values are due to natural causes, the Mattapoisett River is considered to be of Class B quality.

Segment 13 - Mattapoisett Harbor - Mattapoisett Harbor has been classified as an SA body of water by the Division of Water Pollution Control. Nineteen acres of the harbor in the vicinity of the town pier have been closed to shellfishing by the Division of Water Supply, Shellfish Section (formerly in the Department of Public Health). The closure was necessary due to discharges of raw sewage at the Town Pier from a small stormwater and sanitary collection system serving Mattapoisett Center.

Two small unnamed streams which dischsrge to Mattapoisett Harbor were sampled in addition to three sampling points in the harbor itself. Sampling stations MH1 and P12 were located near the mouth of each of these streams, and the sampling results show both to have significant pollution problems. The stream which enters Pine Island Pond and which was monitored by Station P12 receives a secondary discharge from the Rochester Regional High School. The other stream flows through Mattapoisett Center and appears to be subject to leachate from failing septic systems. The flow of these streams, however, is negligible during most of the year; therefore, they have little impact on the water quality of Mattapoisett Harbor.

Sampling station MH3 was sited in Mattapoisett Harbor in the vicinity of the discharge at Town Pier, with the intent of assessing this discharge's impact on the water quality of the harbor. Sampling station MH4 was positioned much farther out, near the mouth of the harbor, to provide an overall assessment of the harbor's quality.

A comparison of stations MH3 and MH4 for both the July and August surveys shows no apparent difference in quality between the two sampling sites. A degradation in the overall quality of the harbor was observed at both stations from July to August.

Total coliform bacteria were found in concentrations well below Class SA criteria at stations MH3 and MH4. The low values are due to the rapid die-off rate coliform bacteria experience under high salinity and intense sunlight conditions.

The nutrient concentrations found at stations MH3 and MH4 are comparable to those found at "clean water" station AC1.

Overall, Mattapoisett Harbor is of SA quality but has obvious problems which are the result of raw sewage discharges at Town Pier. Certain areas of the harbor, particularly the 19 acres closed to shellfishing, are considered to be of Class SB quality, suitable for swimming but not for shellfishing, due to the differing coliform bacteria requirements for each activity.

Segment 14 - Nasketucket Bay - Nasketucket Bay is among the highest quality bodies of water within Buzzards Bay. It receives no wastewater discharges and is open to shellfishing. Due to its expected high quality, the Division has had no sampling stations on the bay.

Segments 15 & 16 - New Bedford Reservoir; Acushnet River to Hamlin Road - The headwaters of the Acushnet River are formed by the New Bedford Reservoir, which is no longer in use but serves as an emergency water supply. The outlet of the New Bedford Reservoir is the start of the Acushnet River. Station AR1, located at the outlet, was the "clean water" station for the 1971 and 1975 surveys.

As expected, the quality of the Acushnet River at this point is excellent and was well within Class B criteria for both surveys. There are no pollution sources to the reservoir; therefore, little change in quality has occurred during the years from 1971 to 1975.

Segment 17 - Acushnet River from Hamlin Road to Main Street - Station AR3, at river mile 5.5, was a station common to both surveys. Upstream of this point, wastes from White's Dairy Farm enter the Acushnet River as a direct discharge to a feeder stream (Station AR2a) and as runoff.

In 1971, the Acushnet River at Station AR3 was severely degraded due to this source of pollution. The dissolved oxygen concentrations were often found near zero. The dairy wastes were still a problem in 1975, but to a much lesser degree.

The survey results from Station AR2a in 1975 show the feeder stream conveying the dairy wastes to be heavily polluted. Its flow is minimal, however, thus limiting its impact on the Acushnet River. Despite the improvement in water quality at Station AR3 between 1971 and 1975, the river is still below Class B criteria. Minimum dissolved oxygen concentrations of 3.8 mg/l in July and 4.3 mg/l in August were recorded. Since 1971, a small impoundment upstream of Station AR3 has been drained, alleviating in part the low dissolved oxygen problems.

A range of 9.0-3.8 mg/l of dissolved oxygen in July and 11.0-4.3 mg/l in August 1975 indicates a high degree of photosynthetic activity which can be attributed to the abundance of nutrients from the dairy wastes. Elimination of this pollution source would likely increase the minimum dissolved oxygen concentrations and decrease the wide fluctuations in range.

Coliform concentrations well in excess of Class B criteria were found at Station AR2a. In general, at Station AR3, coliform bacteria concentrations were within Class B criteria, in contrast to 1971 when a maximum value of 240,000 coliform/100 ml was found.

Considerably more severe D.O. problems were found at the outlet of Sawmill Pond, Station AR5, at river mile 4.6. In July and August of 1975, the BOD_5 values averaged 1.3 mg/1, which is indicative of high quality water. The dissolved oxygen concentrations averaged 2.3 mg/1 in July and 1.5 mg/1 in August 1975. A range of only 4.8-1.9 mg/1 of dissolved oxygen in July and 2.3-0.9 mg/1 in August indicates that there is little photosynthetic activity. Between stations AR3 and AR5, the river is slow-moving due to the small change in elevation. The relatively long time of travel through Sawmill Pond produces low D.O. values due to the assimilation of organic material and the low reaeration rate. The depth of the pond is such that rooted aquatics are not abundant; thus, oxygen is not replenished through photosynthesis. A microscopic analysis of Station AR5 during the July survey showed algae to be almost totally absent.

Between 1971 and 1975 at Station AR5, slight decreases in nitrogen, Phosphorus, and BOD_5 concentrations indicate a minor improvement in water quality, but low dissolved oxygen values persist. Therefore, the Acushnet River is in violation of Class B standards at Station AR5.

A small dam at the outlet of Sawmill Pond reaerates the Acushnet River, resulting in a tremendous improvement in the D.O. concentration. This improvement was monitored at Station AR6, located one-tenth of a mile downstream at river mile 4.5. At this point, the Acushnet River is primarily freshwater but is tidally influenced. In 1971, a minimum D.O. concentration of 3.8 mg/1 was recorded; while in 1975, minima of 4.9 mg/1 for both surveys were found. Average values for 1971 and 1975 are not comparable due to the differing sampling procedures. In 1971, samples were collected primarily during daylight hours, whereas in 1975, samples were collected at four-hour intervals on a 24-hour basis to yield a more accurate average.

Between stations AR5 and AR6 are numerous discharges of raw sewage from private dwellings. Due to the minor nature of these discharges, little water quality degradation is actually seen at Station AR6. The coliform bacteria concentrations did increase to an average of 15,500 col/100 ml in July and 10,000/100 ml in August 1975. These values are an improvement over the maximum of 240,000/100 ml found in 1971.

In 1975, the Acushnet River at Station AR6 is still considered in violation of Class B criteria due to the high coliform bacteria concentrations.

Segments 18 & 19 - Acushnet River from Main Street to Route 6; New Bedford Inner Harbor - Stations AR7, AR8, and NB1 were located on the Acushnet River and New Bedford Inner Harbor, which have been classified as SB by the Division and are physically the same body of water. In 1971, top and bottom sampling was conducted at three points across the harbor which were referred to as west, middle, and east. The results from 1971 indicated only minimal differences among the samples from each transect and little change between top and bottom; therefore, only mid-channel, mid-depth sampling for chemical analysis was conducted in 1975. The stratification of saltwater and freshwater in the harbor did greatly affect the coliform bacteria concentrations; therefore, top and bottom sampling for bacteria was continued.

The 1975 surveys show an overall improvement in the quality of Inner New Bedford Harbor. This can be attributed to actions taken by the City of

New Bedford to limit dry weather flows from combined sewer overflows and the connection of numerous sanitary and industrial discharges to municipal sewer lines.

In 1971, a newly constructed secondary wastewater treatment plant serving the community of Fairhaven had recently been placed on line with the effluent entering the New Bedford Harbor inside the hurricane barrier. During the 1971 survey, the plant was experiencing operational problems and was discharging an effluent of less than secondary quality. At the time of the 1975 surveys, the effluent was of excellent quality and the plume was barely distinguishable.

In 1971, the total coliform bacteria concentrations were considerably higher than 1975 at all inner harbor stations. This is due to the raw sewage flows from the sources previously mentioned. The results from both years show a large variance in coliform concentrations for samples collected from top and bottom waters. Much higher values were found in samples collected from surface waters, due to the nature of the lighter freshwater to overlay the heavier saline waters. Coliform bacteria experience a rapid die-off rate in highly saline waters.

Dissolved oxygen samples collected from the bottom waters of stations AR7 and AR8 were generally well below the 5.0 mg/l minimum allowable for Class SB waters. The demand exerted by the bottom muds which have accumulated in the harbor over the years is responsible.

The lower BOD_5 results from 1975 confirm the fact that discharges of raw sewage and industrial wastes have been greatly reduced. This has also resulted in the overall reduction of nitrogen and phosphorus levels.

The quality of New Bedford Harbor has improved since 1971 but is still well below Class SB quality. It will likely remain less than SB quality for the near future due to the accumulation of toxic concentrations of heavy metals in the bottom muds. It is encouraging to note, however, that a comparison of the heavy metal concentrations in the bottom muds shows a decrease from 1971 to 1975. The concentrations remain at levels which are toxic to most benthic organisms, and dredging will be required for Inner New Bedford Harbor to meet SB criteria.

Segment 20 - Outer New Bedford Harbor - The overall quality of Outer New Bedford Harbor has also improved from 1971 to 1975. This is due to the construction of a primary wastewater treatment facility serving the City of New Bedford. The effluent is discharged to Buzzards Bay via a 3,300-foot-long outfall. The same outfall discharged untreated wastewater during the 1971 survey.

Station NB3, located in the vicinity of the plume from New Bedford's discharge, experienced a noticeable improvement in quality from 1971 to 1975. Due to the chlorinated effluent in 1975, the coliform bacteria concentrations decreased to levels acceptable for SA waters. The results from stations NB2 and NB5, which were common to both surveys, also indicate a general water quality improvement in the outer harbor.

New Bedford Outer Harbor, despite the low coliform bacteria levels, is considered to be of SC quality due to the magnitude of the pollutional load from New Bedford's wastewater treatment plant.

The problem with toxic concentrations of heavy metals in bottom muds is much less severe in the Outer Harbor. Extremely high concentrations of metals were found in the bottom muds collected at Station NB3 (New Bedford's discharge). At Pope Beach, Station NB5, the sediment consisted of only 0.6% organic material (dry weight basis), and the heavy metals concentrations were greatly reduced. Chromium, which was found in a concentration of 355 mg/kg at NB3, decreased to 43 mg/1 at NB5. While this is a definite improvement, the sediment at Station NB5 still represents an unsuitable environment for shellfish. The Outer Harbor has therefore been closed to shellfishing by the Division of Water Supply's Shellfish Section. Heavy metals continue to be discharged to the Outer Harbor from numerous metal-plating industries connected to the New Bedford Wastewater Treatment Plant, but their concentrations are considerably less due to each industry pretreating its effluent prior to discharge to the municipal system. The primary facility removes a considerable amount of the sludge formerly discharged to the harbor but removes very little of the metals which are in solution.

Segment 21 - Clark Cove - The 1971 New Bedford Harbor survey had one station (NB4) on Clark Cove. Its purpose was to assess the impact of sewage bypasses from the Rodney French Drive West Pumping Station. The frequency of these overflows had been greatly reduced by 1975; therefore the station location was changed to the most sensitive land use area, Jones Park Beach, located on the opposite side of the cove. In 1975, this station was labeled CC1.

Clark Cove has been classified as an SA body of water by the Division. There are twelve combined sewer overflows from New Bedford's collection system which periodically discharge to the cove. The intermittent nature of these wastewater flows results in widely varying water quality. No problems were found in Clark Cove during the 1971 or 1975 surveys. It is likely, however, that at times of heavy precipitation, raw sewage bypasses from the pumping station and the combined sewer overflows result in a temporarily lower quality. Due to these wastewater sources, Clark Cove has been closed to shellfishing by the Division of Water Supply's Shellfish Section. It is open to the taking of quahogs, which are less sensitive to polluted waters than other forms of shellfish.

The overall quality of Clark Cove is considered to be SB due to the temporary water quality problems resulting from discharges of untreated sewage.

Segment 22 - Apponagansett Bay - The 1975 Buzzards Bay surveys had one station on Apponagansett Bay (AP1) and one on Buttonwood Brook (AP2), which is a small tributary to the Bay.

The sampling results from Station AP2 in general indicate that Buttonwood Brook is not meeting Class B criteria. Nitrate-nitrogen averaged 1.2 mg/1 in July and 1.5 mg/1 in August, which indicates the possibility of failing septic systems upstream. The coliform bacteria concentrations were continually in violation of Class B criteria, with a maximum of 8,500 col/100 ml

found on August 19, 1975. These values further indicate a source of sewage to the brook.

While Buttonwood Brook is not grossly polluted, the concentrations of coliform bacteria found are in violation of Class B criteria and it is therefore considered to be of Class C quality. Buttonwood Brook, depsite its water quality problems, is not a major source of pollution to Apponagansett Bay due to its minimal flow.

Apponagansett Bay has been classified as SA waters by the Division of Water Pollution Control.

The community of Dartmouth has a recently completed secondary wastewater treatment plant which discharges via a deep ocean outfall to Buzzards Bay. Much of the area surrounding Apponagansett Bay remains to be sewered to the plant, and failing septic systems are a problem. As a result, 37 acres of the Inner Harbor have been closed to shellfishing by the Division of Water Supply.

Station AP1 was located on Gulf Hill Road at the inlet to a smaller bay within Apponagansett Bay. During the July survey, total coliform bacteria were present in concentrations acceptable to SA waters. In August, the total coliform bacteria concentrations increased to an average of 2,550 col/100 ml, which is in violation of Class SB standards. The source is believed to be failing septic systems in addition to discharges of sanitary waste from the numerous pleasure craft moored within the harbor. The nitrogen and phosphorus concentrations were slightly in excess of these found at "clean water" station AC1, further indicating sources of sanitary waste. These concentrations are still quite low, however, and the amount of biodegradable organic material is minimal, as indicated by the BOD_5 results which ranged from 0.0 mg/1 to 2.2 mg/1.

It is difficult to assess the quality of an entire harbor on the basis of results from one sampling station. The high coliform bacteria counts found at Station AP1 indicate possible sources of sanitary waste to the Bay and, therefore, the Bay is believed overall to be of SB quality. The 37 acres which have been closed to shellfishing are also likely to be of SB quality and are suitable for swimming but have been closed due to the more stringent coliform bacteria requirements for the taking of shellfish.

Segment 23 - Paskamanset River - The 1975 Buzzards Bay surveys had four stations on the Paskamanset River which were located with the intent of assessing the impact of two sanitary landfills sited near the river's course. Station PA1, loacted at the outlet of Turner Pond, was chosen as a "clean water" station as there are no known sources of pollution upstream of this point.

The Paskamanset River at Station PA1 has a high concentration of organic material which is indicated by the average COD values of 112 mg/1 in July and 99 mg/1 in August. The BOD_5 results of 3.3 mg/1 in July and 1.3 mg/1 in August show that little of this material actually exerts an oxygen demand on the river.

Dissolved oxygen concentrations were continually found below the 5.0 mg/1 minimum allowable for Class B waters. This is believed due to the large wetland areas forming the headwaters and the characteristically low D.O.

concentrations found in these waters. The unusually low pH values, which ranged from 4.5 to 4.9, are also characteristic of wetland waters. The stagnant nature of these waters affords little reaeration.

Due to the natural conditions producing the low dissolved oxygen values, the Paskamanset River at this point is considered to be meeting standards.

Station PA2 was initially intended to directly monitor possible leachates from the New Bedford Sanitary Landfill. This station was dropped from the July survey due to its inaccessibility. It was positioned on the main stem of the Paskamanset River, downstream of the New Bedford sanitary landfill at Route 6 in Dartmouth, for the August survey.

The results from the August survey at Station PA2 indicate that there are no problems with leachate from the landfill site. At Station PA1, the total coliform bacteria were well below Class B criteria. (A maximum of 100 col/100 ml were found in August.) At Station PA2, the total coliform bacteria concentrations for the August survey were in violation of Class B standards, averaging 1,600 col/100 ml. This is only slightly above the average allowable for Class B waters and could be the result of other unknown sources of pollution. The nutrients experienced only slight increases in concentration, while the COD values decreased, indicating no important input of organics from the landfill site.

Due to the reaeration between stations PA1 and PA2, the dissolved oxygen concentrations increased to an average of 5.3 mg/l in August, with a minimum of 4.6 mg/l recorded.

The coliform bacteria at Station PA2 are only slightly above the Class B allowable average and are not sufficient to consider the Paskamanset below Class B standards.

Stations PA3 and PA4 were located on the Paskamanset River above and below the Dartmouth sanitary landfill with the intent of assessing any leachate or runoff problems. There is little change in quality between stations PA2 and PA3, other than the continued recovery in dissolved oxygen concentrations.

Coliform bacteria were also found at Station PA3 in numbers slightly higher than expected, indicating possible failing septic systems. This problem appears to be minor, as there is no increase in the nutrients and COD values.

There are suspected leachate problems with the Dartmouth sanitary landfill. The results from stations PA3 and PA4 do not indicate any water quality problems resulting from the leachate, however. Overall, an improvement in quality is seen between stations PA3 and PA4 with reductions in coliform bacteria and nutrient concentrations. The Paskamanset River at this point is considered to be of Class B quality despite the dissolved oxygen concentrations which periodically fall below the 5.0 mg/l minimum allowable for Class B streams. The Paskamanset River is by nature a slow-moving and meandering river which drains large wetland areas. As a result, reaeration is minimal and low dissolved oxygen concentrations are found along its entire length.

Segment 24 - Slocums River - Sampling Station PA4 marks the end of the Paskamanset River and the beginning of the Slocums River. The Slocums is tidal along its entire length and has no known pollution problems. It easily meets its SA classification and is open to shellfishing.

Segments 25 & 26 - Shingle Island River; Noquochoke Lake - The headwaters of the East Branch of the Westport River are formed by the Shingle Island and Copicut Rivers above Noquochoke Lake in Dartmouth.

A former Dartmouth sanitary landfill site is located near the course of the Shingle Island River in the vicinity of its headwaters. Sampling Station S11 was positioned downstream of the landfill site at Pine Island Road to assess any possible leachate or runoff problems. The results from both the July and August surveys indicate that the landfill is not a source of pollution to the Shingle Island River. The quality of the river at Station S11 is excellent and is well within Class B criteria.

Station WPE1 was located at the outlet of Noquochoke Lake, which is the actual beginning of the Westport River. Dissolved oxygen concentrations were occasionally found below the 5.0 mg/l minimum allowable for Class B waters during the July survey, but this was believed due to natural conditions. In all other respects, the Westport River at Station WPE1 is meeting Class B criteria.

Segment 27 - Westport River, East Branch, from outlet of Noquochoke Lake to Old County Road - Station WPE2 was located on the Westport River at Old County Road, two miles downstream from Station WPE1. Between the two stations, the Westport River receives a treated wastewater discharge from the Lincoln Park Amusement Company. There is also a moderate amount of development along the river in this area, and failing septic systems are a possibility.

At sampling Station WPE2, the Westport River does not meet Class B standards due to high counts of coliform bacteria which are probably the result of the previously mentioned sources. In July and August, the coliform bacteria averaged 3,300 and 5,000/100 ml, respectively. The ammonia- and nitrate-nitrogen concentrations increased noticeably, which would be expected downstream of a treated sanitary wastewater discharge. The phosphorus level did not increase, which may be due to the phosphorus removal employed at the Lincoln Park wastewater treatment plant.

Station WPE2 marks the division between the upstream waters classified as B waters and the downstream, tidally influenced waters of SA classification.

Segment 28 - Westport River, East Branch, from Old County Road to river mouth - Station WPE3 was located on Hix Bridge Road on the Westport River and is 3.7 miles downstream from Station WPE2. The quality of the Westport River at this station is similar to that at WPE2, with the exception of the coliform bacteria counts, which decreased to nearly acceptable Class SA levels.

Station WPE4 was positioned on a small tributary to the Westport River which is in the vicinity of the Westport sanitary landfill. The results from both surveys indicate the landfill has no water quality impact on the Westport River.

The final station on the Westport River, East Branch, was located on the Route 88 bridge near the river's mouth. The results from this station and Station WPE3, located 4.1 miles upstream, indicate that this SA classified stretch of the river at times violated coliform bacteria requirements. During the July survey, the total coliform bacteria concentrations at Station WPE5 were well within SA requirements, with an average of 22 col/100 ml (low tide) while in August the concentration rose to 1000/100 ml (low tide), which is well above the median of 70/100 ml allowable for SA waters.

The increased coliform bacteria concentrations in August are possibly due to discharges of untreated sanitary waste from recreational and commercial watercraft near the river's mouth. Despite the higher than expected bacteria concentrations, the East Branch of the Westport River is considered to be of SA quality overall. The mere possibility of sanitary discharges, however, places the shellfishing beds in danger of closure.

Segment 29 - Westport River, West Branch - The 1975 Buzzards Bay survey had one sampling station (WPW1) on the West Branch of the Westport River at the United States Geological Survey gaging station in Tiverton, Rhode Island. The gaging station divides the upstream freshwater portion of the river located in Rhode Island from the downstream salt-water portion located primarily in Massachusetts.

There are no known wastewater discharges to the West Branch of the Westport River, but an average of 1700 coliform/100 ml were found in July. In August the average was 200/100 ml, which is well within Class B criteria. During both surveys, all other parameters were found to be within Class B criteria indicating this pollution source to be minor.

The tidal portion of the river has been classified as SA by the Division and is believed to be currently meeting this classification. Like the East Branch, this portion of the river is subject to possible discharges of untreated sanitary waste from commercial and pleasure craft. Both the East and West Branches of the Westport River are high-quality shellfishing areas, but the possibility of sanitary discharges in the vicinity of the beds places them in danger of closure.

TABLE 3

BUZZARDS BAY BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFI-CATION
1	Buttermilk Bay	---	---	---	SA	SA
2	Onset Bay	---	---	---	SA	SA
3	Agawam River	Above Wareham STP	Above 2.0	---	B	B
3a	Agawam River	Below Wareham STP	2.0-0.0	2.0	B	B
4	Wankinco River	Entire length	---	---	B	B
5	Wareham River	Entire length	---	---	SB	SA
6	Weweantic River	Above outlet of Horseshoe Pond, Wareham	Above 4.1	---	B	B
7	Weweantic River	Outlet, Horseshoe Pond, to the mouth, Wareham-Marion	4.4-0.0	4.4	SA	SA
8	Sippican River	Above County Road, Marion-Wareham	Above 2.1	---	B	B
9	Sippican River	From County Road, Marion-Wareham, to mouth, Marion-Wareham	2.1-0.0	2.1	SA	SA
10	Sippican Harbor	---	---	---	SA	SA
11	Aucoot Cove	---	---	---	SA	SA
12	Mattapoisett River	Entire length	---	---	B	B
13	Mattapoisett Harbor	---	---	---	SA	SA
14	Nasketucket Bay	---	---	---	SA	SA

TABLE 3 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
15	New Bedford Reservoir	Acushnet	Above 8.2	---	B	B
16	Acushnet River	From outlet, New Bedford Reservoir, to Hamlin Road, Acushnet-New Bedford	8.2-5.5	2.7	B	B
17	Acushnet River	From Hamlin Road to Main Street, Acushnet-New Bedford	5.5-4.5	1.0	C	B
18	Acushnet River	From Main Street to Route 6 Acushnet-New Bedford	4.5-1.2	3.3	U	SB
19	Inner New Bedford Harbor		1.2-0.0	1.2	U	SB
20	Outer New Bedford Harbor		---	---	SC	SA
21	Clark Cove	New Bedford-Dartmouth	---	---	SB	SA
22	Apponagansett Bay	Dartmouth	---	---	SB	SA
23	Paskamanset River	Dartmouth-New Bedford	13.6-4.0	9.6	B	B
24	Slocums River	Dartmouth	4.0-0.0	4.0	SA	SA
25	Shingle Island River	Dartmouth	Above 14.2	---	B	B
26	Noquochoke Lake	Dartmouth	14.2-12.0	2.2	B	B
27	Westport River, East Branch	From the outlet of Noquochoke Lake, Dartmouth, to Old County Road, Westport	12.0-10.0	2.0	C	B
28	Westport River, East Branch	From Old County Road, Westport to the mouth, Westport	10.0-0.0	10	SA	SA

TABLE 3 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
29	Westport River, West Branch	Entire lenth	---	---	SA	SA

Total Miles of Class SA - 20.5
Total Miles of Class B - 16.5
Total Miles of Class C - 3.0
Total Miles of Unsatisfactory Conditions - 3.3

CHARLES RIVER BASIN

Present Conditions

Segment 1 - Source to Dilla Street, Milford - Water of this segment, which includes public water supply for the Town of Milford (Echo Lake), is of uniformly high quality, although the sampling at Dilla Street yielded total coliform levels apparently in violation of the Class A criterion. However, during the Division's 1973 surveys, a compositing technique for coliform samples was used; this technique was subsequently discarded because of the likelihood of sample contamination. For this reason, except where severe contamination is beyond question, the 1973 coliform data are taken cum grano.

Segment 2 - Dilla Street to Main Street, Milford - This segment mostly comprises Cedar Swamp Pond, Milford, a shallow, eutrophic impoundment. This pond is choked with rooted aquatic weeds and exhibits high algae levels. D.O. concentrations are at the same time very low (minimum less than 2.0 mg/1, average less than 5.0 mg/1), indicating organic pollution also. Nutrient concentrations are moderately high. Due to infiltration/inflow, this segment is subject to sewer overflows/bypasses from Milford. Other sources of pollution are urban runoff and the old Milford dump located on the bank of the pond. There were formerly a few minor industrial discharges here.

Segment 3 - Main Street to Milford STP - Excessive algae, low minimum D.O. (less than 2.0 mg/1), and high nutrient concentrations characterize this segment. Milford's sewer system has overflows/bypasses affecting this segment. In Hopedale, Farrar & Carty, Inc., operates a sanitary landfill located by the floodplain of the Charles.

Segment 4 - Milford STP to Mine Brook, Franklin - This is one of the three most severely polluted segments in the Charles River Basin. Below the Milford STP are encountered depressed D.O. (minimum less than 1.0 mg/1), toxic ammonia concentrations (as high as 6.9 mg/1 as N), extremely high nutrient concentrations (nitrate-nitrogen greater than 2.0 mg/1, total phosphorus as high as 5.0 mg/1), and bacterial contamination. This segment is subject to algal blooms and nuisance duckweed growths (both observed in Box Pond, Bellingham, in 1973). Nitrification in this segment is probable. In addition to the Milford STP, the Division's regional engineer indicates that problems with subsurface disposal systems in North Bellingham are not uncommon.

Segment 5 - Mine Brook to Populatic Pond outlet - Pollution of this segment is primarily from the Franklin STP, entering the main stem via Mine Brook. D.O. levels are depressed but remain above 2.0 mg/1. Nutrient concentrations are high, and algal blooms occur. Other pollution sources in this segment are subsurface disposal systems in the Shepards Brook area of Franklin, Medway's Broad Street sewer (discharging into Great Black Swamp), and urban runoff. There is also a minor discharge from Your Laundry in Medway.

Segment 6 - Populatic Pond outlet to Stop River, Medfield - Having no point sources and only a sparsely developed local drainage area, this segment is not severely polluted. D.O. levels are moderately depressed, and nutrient concentrations remain fairly high. Pollution from subsurface disposal systems in Medfield is documented.

Segment 7 - Stop River, Medfield, to Sugar Brook, Millis - Nutrient and D.O. concentrations indicate moderate pollution in this segment. Pollution sources

include subsurface disposal systems in Medfield, point and non-point sources entering via the Stop River, and other non-point sources.

Segment 8 - Sugar Brook to Bridge Street, Dover - In this segment, algal levels are fairly high; nevertheless, D.O. levels are depressed (averaging less than 5.0 mg/1). Also, bacterial contamination occurs. (Species of Salmonella were isolated here by FWPCA in 1967.) Nutrient concentrations are comparable to those in Segments 6 & 7. The major pollution sources enter via Sugar Brook; the Medfield State Hospital and the newly constructed Medfield STP also contribute pollutants. In Holliston, subsurface disposal systems and a metal finishing industry, Ty-Car Manufacturing Co., are pollution sources for Bogastow Brook, a tributary to Segment 8.

Segment 9 - Bridge Street to South Natick Dam - The condition of this segment is similar to that of Segment 8 but with slightly higher D.O. concentrations (averaging greater than 5.0 mg/1), partly due to higher algal productivity. There are no point sources of pollution in this segment.

Segment 10 - South Natick Dam to Watertown Dam - The Middle and Lower Charles River, which comprise this segment, exhibit high algal productivity, moderately depressed D.O. levels, bacterial contamination, occasional instances of oil pollution, widespread litter and debris, and locally severe water quality degradation in the vicinity of several old landfill (dump) sites, notably in Newton and Waltham. There are no significant wastewater discharges in this segment. An important source of algal nutrients appears to be the upstream point sources. However, sources within this segment do contribute significant nutrient and organic waste loads. These include sewer overflows/bypasses in Waltham and the Middle Watershed; urban runoff; and, at least in portions of Wellesley, Natick, and Weston lying in the Morses Pond watershed, subsurface disposal systems. Mishaps of various kinds at industrial sites have commonly caused oil spills and similar transient problems.

Segment 11 - Mine Brook, source to Franklin STP - This segment is generally of high quality. The Class B D.O. criterion is satisfied. Moderately high nutrient levels occur, but algal activity is not excessive.

Segment 12 - Mine Brook, Franklin STP to confluence - This is one of the three most severely polluted segments in the basin. Very low D.O. levels (typically less than 1.0 mg/1), bacterial contamination, ammonia toxicity (concentrations higher than 4.0 mg/1), and unnatural color are found in this reach. The primary source of pollution is the Franklin STP; note that this facility has been renovated since the 1973 survey, at which time it was operating at a low level of efficiency. The source of color in this segment is industrial dyeing wastes, discharged by the Franklin STP. Perhaps due to light limitation caused by this color, there is very little growth of algae in this segment. About a mile from Mine Brook, Garelick Farms, a commercial dairy, intermittently discharges wastes to a swamp which is tributary to this segment.

Segment 13 - Stop River, source to Pondville State Hospital - This headwater segment is of slightly degraded quality, probably as a result of organic matter originating from wetland runoff. D.O. does not meet the Class B criterion, although the minimum exceeds 5.0 mg/1. Nutrient concentrations are moderately high.

Segment 14 - Stop River, Pondville State Hospital to Norfolk-Walpole MCI - D.O. concentrations are depressed in this segment (minimum less than 1.0 mg/1). Nutrient levels differ only slightly from those in Segment 13. Both the Pondville State Hospital and the Wrentham State School (via a small, marshy tributary) discharge to this segment. However, data indicate that the major contribution of nutrients and organic matter is from non-point sources. Natural drainage from adjacent wetlands, which are extensive in this segment, is probably the main contributor of these substances.

Segment 15 - Stop River, Norfolk-Walpole MCI to confluence - This reach exhibits depressed D.O. levels (averaging less than 5.0 mg/1) and moderately high nutrient concentrations. Discharging to this segment is the treatment facility of the Norfolk and Walpole MCI. But here again, non-point sources, and in particular wetland drainage, are indicated as the major contributors of organic matter and nutrients.

Segment 16 - Sugar Brook, Route 109, Millis, to confluence - This segment encompasses virtually all of Sugar Brook, a small tributary draining less than one square mile. It is the most severely polluted segment in the basin. At Route 109, National Can Corp. and Cott Corp. discharge wastewaters to the brook, and the Millis STP discharges to the brook further downstream. In this brook occur anaerobic conditions, ammonia toxicity (concentrations as high as 8.4 mg/1), extremely high total phosphorus concentrations (above 4.0 mg/1), extremely low pH (as low as 2.6), bacterial contamination, sludge deposits, and offensive odors. The sole use of this brook has for many years been the conveyance of wastes. The Millis municipal sanitary landfill is also located in this tiny sub-watershed.

Segment 17 - Watertown Dam to Charles River Dam - The Charles Basin, located in Metropolitan Boston is an 8.6 mile long impoundment of the Charles River. The main sources of pollution in the basin are combined storm and sanitary sewer overflows. Other sources are those passed on by the Charles itself and from urban runoff. Sludge deposits (a secondary effect of combined sewer overflows) induce anaerobic conditions in the stagnant saline bottom waters. High coliform bacteria counts seem to be the major obstacles preventing improved water quality in the basin.

TABLE 4

CHARLES RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Charles River	Source to Dilla St., Milford	Above 76.5	1.0	A	A
2	Charles River	From Dilla St. to Main St., Milford	76.5-75.2	1.3	U	B
3	Charles River	From Main St. to Milford STP	75.2-73.4	1.8	U	B1
4	Charles River	From Milford STP to Mine Brook	73.4-63.1	10.3	U	B1
5	Charles River	From Mine Brook to outlet of Populatic Pond	63.1-58.9	3.2	C1	B1
6	Charles River	From outlet of Populatic Pond to Stop River	58.9-51.8	7.1	C1	B1
7	Charles River	From Stop River to Sugar Brook	51.8-49.8	2.0	C1	B1
8	Charles River	From Sugar Brook to Bridge St.,Dover	49.8-44.6	5.2	C1	B1
9	Charles River	From Bridge St., Dover, to South Natick Dam	44.6-41.1	3.5	C1	B
10	Charles River	From South Natick Dam to Watertown Dam	41.1-9.8	31.3	C	B
11	Mine Brook	Source to Franklin STP	Above 4.1	0.4	B	B
12	Mine Brook	Franklin STP to confluence	4.1-0.0	4.1	U	B
13	Stop River	Source to Pondville State Hospital	Above 7.8	0.2	B1	B

TABLE 4 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
14	Stop River	From Pondville State Hospital to Norfolk-Walpole MCI	7.8-4.0	3.8	U	B
15	Stop River	From Norfolk-Walpole MCI to confluence	4.0-0.0	4.0	U	B
16	Sugar Brook	From Route 109, Millis to confluence	1.6-0.0	1.6	U	B
17	Charles River Basin	From Watertown Dam to Charles River Dam, Boston Harbor, Boston	9.8-0.0	9.8	U	C

Total Miles of Class A - 1.0
Total Miles of Class B - 0.4
Total Miles of Class B1 - 0.2
Total Miles of Class C - 31.3
Total Miles of Class C1 - 25.0
Total Miles of Unsatisfactory Conditions - 31.8

CHICOPEE RIVER BASIN

Present Conditions

Segment 1 - Ware River above MDC intake - The headwaters of the Ware River consist of a series of wetlands and marshes separated by short sections of rapids. The marshes can add a brownish color to the water, but D.O. values remain near saturation. Total coliform densities vary with runoff and stream temperatures can vary significantly, but these responses to natural conditions do not violate water quality standards. At the bottom of this segment, the MDC intake works diverts Ware River water to Quabbin Reservoir to be used eventually as drinking water.

Segment 2 - Ware River, MDC intake to South Barre - From the MDC intake works to the Village of South Barre, water quality conditions are much the same as in Segment 1. However, this segment has a B classification, permitting wider recreational uses of the stream, since it is no longer used for a public drinking water supply.

Segment 3 - Ware River, South Barre to Prince River - Below the Village of South Barre, Class B water quality criteria are violated by high coliform densities. A small section of South Barre is sewered to a septic tank at Barre Wool Combing which, in turn, discharges to the Ware River. The discharge is not large enough to create heavy oxygen demands on the stream, but the background nutrient levels rise slightly.

Segment 4 - Ware River, Prince River to Wheelwright Dam - The Ware River, from the confluence of the Prince River to the Wheelwright Dam, is classified C. This segment was once severely polluted by industrial wastes discharged from lagoons at Barry Wool Combing and transported to the Ware by the Prince River. The company recently began phasing out its operation in Barre, but there is still a small discharge from the lagoons. During the 1974 water quality survey this segment basically met Class C criteria except for one day when floating solids appeared in the impoundment and D.O. values fell below 5.0 mg/1 during the morning hours. The discharge from the lagoons is believed responsible for this. In addition, total coliform densities were occasionally high due to carryover from Segment 3.

Segment 5 - Ware River, Wheelwright Dam to Hardwick STP - Sewage from the Village of Wheelwright is first passed through sand filters and then discharged directly to the Ware River below the Wheelwright Dam. The discharge is small and intermittent, and the Ware River receives no additional discharges until the Village of Gilbertville. The resulting water quality of the stream meets Class C criteria, but coliform densities are occasionally high due to the discharge of sewage.

Segment 6 - Ware River, Hardwick STP to Ware Dam - The Ware River previously received the discharge from combined sewers in the Village of Gilbertville. Downstream of the village, total coliform densities were continually high during the 1974 survey, but D.O. levels were not depleted because of the segment's high reaeration rates. Since the 1974 survey, a new wastewater treatment plant in the village has become operational, and a significant improvement in water quality is expected. Confirmation of this will be sought in the monitoring program and in the next intensive water quality survey of the basin.

In the impoundment below the Town of Ware, the D.O. fluctuated diurnally in response to the algal effect, but no violations of Class C criteria were observed in 1974.

Segment 7 - Ware River, Ware Dam to Gibbs Crossing - Below the Ware Dam the river passes through the industrial center of Ware and receives numerous discharges. Initially, the stream's D.O. is maintained by high reaeration rates, but the river is degraded by color and solids. Stream phosphorus concentrations rise at this point and take another substantial jump a short distance downstream when the river receives the effluent from the Ware STP. Below this point the nutrient-enriched waters show significant diurnal fluctuations and minimum D.O.'s often drop below 3.0 mg/1. The low D.O. and the general aesthetic degradation of the river make the present condition of this segment U.

Segment 8 - Ware River, Gibbs Crossing to Thorndike Dam - Although there are no new discharges introduced, a new segment is started at the Route 32 bridge at Gibbs Crossing. At this point the D.O. sag created by domestic and industrial wastes from the Town of Ware begins to level out and recover. From this point to the Thorndike Dam, the river slows and meanders through farm and pastureland. Solids settle out in this segment, and a secondary process of stream assimilation, nitrification, occurs. Within the segment there are occasional violations of D.O. and total coliform criteria. Survey data suggest that these violations are at least partially due to runoff from the surrounding farmland. In the impoundment in Thorndike, floating clumps of sludge and gas bubbles rising from the bottom near the dam were noted. Although the water is shallow, the bottom was not visible because of the water's turbidity. These results indicated that the impoundment provides for settling and decomposition of sewage and textile wastes from the Town of Ware. Nutrient concentrations are still high enough to sustain a significant algal population. In 1974, the average D.O. at this point was 6.8 mg/1, but concentrations often dropped below 5.0 mg/1 at night. The present condition of this segment borders between C and U, with its water quality problems largely stemming from carryover from Segment 7.

Segment 9 - Ware River, Thorndike Dam to confluence - Below the Thorndike Dam the Ware receives the discharge from Diamond International (a paper company) and small discharges of raw sewage from the Village of Thorndike. The industry contributes to high solids and BOD concentrations in the stream, and the sewage raises the total coliform counts. Decomposition in the impoundment fertilizes the stream with nitrate. The Ware River becomes choked with weeds in this segment. Diurnal fluctuations in combination with high BOD loadings contribute to violations in D.O. criteria during low flow conditions. These violations in criteria along with the eutrophication of the stream make the present condition of this segment U.

Segment 10 - Prince River - The Prince River was not sampled during the 1974 water quality survey, so specific violations of its B classification are not reported here. The river presently receives cooling water and a small amount of sanitary waste from the Charles G. Allen Company in Barre. Because the Prince River does not presently receive a municipal discharge, it is classified anti-degradation. The present discharges will have to be eliminated or provided with a high degree of treatment.

Segment 11 - Swift River above Winsor Dam - This segment consists of the upper three branches of the Swift River and Quabbin Reservoir. The waters are used for a public drinking water supply and recreational uses are restricted. There are no discharges into the segment and no known violations of water quality criteria.

Segment 12 - Swift River, Winsor Dam to Bondsville - Below Winsor Dam water temperatures fluctuate with releases from Quabbin Reservoir. These releases are from over 40 feet below the surface of the reservoir, and these waters can be as much as 15°F below surface water temperatures. Just below Winsor Dam the Swift River receives the discharge from the Charles L. McLaughlin Trout Hatchery. This discharge is high in suspended solids which quickly settle to the stream bed. Cold stream temperatures and high reaeration rates keep D.O. concentrations high. No known violations of Class B criteria occur; but the segment is classified as anti-degradation, demanding a high degree of treatment or elimination of the discharge.

Segment 13 - Swift River, Bondsville to confluence - In the Village of Bondsville, the Swift River receives discharges from combined sewers. The discharges are small and do not place an assimilative burden on the stream. However, the discharges do occasionally violate Class B total coliform bacteria criteria.

Segment 14 - Seven Mile River above Spencer STP - This segment consists of the upper reaches of the Seven Mile River above the confluence of the Cranberry River. There is a swampy section in this segment that adds color and lowers D.O. concentrations slightly, but no violations of Class B criteria occur.

Segment 15 - Seven Mile River, Spencer STP to confluence - In this segment the Cranberry River flows into the Seven Mile, bringing with it the effluent from the Spencer STP. The discharge is just upstream (about a tenth of a mile) from the mouth of the Cranberry River so that this tiny tributary is not segmented. The treatment plant offers a high degree of treatment (secondary plus sand filters), but the stream's meager flow severely limits its assimilative capacity. Carbonaceous demands are largely satisfied in the treatment process, but the nitrogen (in the form of ammonia) discharged by the plant is quickly oxidized in the stream. The nitrogenous demand coupled with diurnal fluctuations from the phosphorus-fertilized waters brought minimum D.O. values down to 3.9 mg/l during the 1974 survey. High instream concentrations of BOD, suspended solids, ammonia, and phosphorus reflect the poor dilution offered by the stream rather than an inefficient treatment plant. Therefore, this segment is water quality limited, requiring a high degree of treatment to achieve water quality standards.

Segment 16 - East Brookfield River, source to Quaboag Pond - As the Seven mile River joins the West Brookfield River, nitrogenous oxygen demands are largely satisfied. In addition, the dilution increases the stream's assimilative capacity and decreases nutrient concentrations. However, D.O. concentrations still dip below 5.0 mg/l owing to diurnal fluctuations and violate Class B criteria. Because nutrients are still a problem, this segment, too, is water quality limited, for nutrient removal is needed to meet standards. This segment ends at the inlet to Quaboag Pond. Lake environments

require totally different sampling and analysis methods and therefore will not be discussed here. The results of a one-year intensive study on Quaboag Pond by this Division is available and is appended to this plan.

Segment 17 - Quaboag River above Route 67 bridge - The headwaters of the Quaboag River emerging from Quaboag Pond continue to respond more as a lake environment than as a flowing stream. For approximately six miles the river's elevation drops only a few feet, and the stream flow is sluggish and meandering. The surrounding area is marshland. The upper end of this segment receives the effluent from the North Brookfield STP via Dunn Brook. Although in-stream BOD values are low, by the end of the segment D.O. values dip below 3.0 mg/l. Swamps and marshy areas often have natural oxygen sinks, such as decaying vegetation. This fact coupled with the extremely low reaeration rates results in a low D.O. Even with no wastewater discharge, this segment might still have a low D.O. due to natural conditions.

Minimum D.O.'s in this segment occurred in coincidence with diurnal fluctuations, even though nutrient concentrations were low. This was not surprising since the segment acts, in some respects, more like standing water than flowing water, and standing water is more sensitive to small concentrations of nutrients.

Segment 18 - Quaboag River, Route 67 bridge to Warren STP - In West Brookfield, the Quaboag River turns southward and the gradient increases. Higher reaeration rates quickly replenish the stream's D.O. Total coliform densities slightly exceed Class B criteria. These are probably due to overland runoff, for there are no point sources of pollution in the area. Because this does not inhibit any present or anticipated future use of the segment, its present condition is given as B.

Segment 19 - Quaboag River, Warren STP to Route 32 bridge - The Quaboag River's gradient continues to increase in this segment and this portion of the stream is comprised mainly of rapids. The rocky bottom and high reaeration rates give this segment an excellent assimilative capacity. The small discharge from the Warren STP has little effect on instream BOD and D.O. measurements. Total coliform densities are, again, slightly higher than Class B criteria. In general, however, this segment's present condition is B.

Segment 20 - Quaboag River, Route 32 bridge to confluence - In its final five river miles, the Quaboag River receives numerous discharges from the towns of Palmer and Monson. Only under severe low flow conditions is the water's oxygen content affected, for reaeration rates are generally high. The combined sewer discharges contribute to high coliform densities that violate Class B criteria.

Segment 21 - Dunn Brook, above No. Brookfield STP - This segment consists of the headwaters of Dunn Brook. There are no known discharges in the segment and no known violations of Class B criteria.

Segment 22 - Dunn Brook, No. Brookfield STP to confluence - The North Brookfield STP discharges to Dunn Brook approximately three river miles above the confluence with the Quaboag River. The stream was last sampled during the 1972 survey, at which time D.O., total coliform, and total phosphorus concentrations violated Class B criteria. The stream's tiny size severely limits its assimilative capacity, and this segment is therefore water quality limited.

Segment 23 - Chicopee Brook - Chicopee Brook joins the Quaboag River about 4.5 miles above the Quaboag's mouth. The brook was not sampled during the previous intensive water quality surveys, but the water quality is monitored by this Division's Western Regional Office. The stream receives several discharges of cooling water and plating wastes from Zero Manufacturing, American Standard, and Dan Wesson Arms just downstream of Church Pond.

Segment 24 - Chicopee River to Red Bridge Dam - The Ware and Quaboag Rivers join in the Village of Three Rivers to form the Chicopee River. Initially, this river is wide and rapid with a good assimilative capacity. Small discharges from combined sewers in the Village of Three Rivers appear in the survey results as occasionally high total coliform densities. Two miles downstream, the river enters the Red Bridge impoundment. The impoundment maintains an algal population because residual concentrations of nutrients from the Ware and Quaboag Rivers are relatively high. D.O. concentrations in the impoundment remained high during the 1972 and 1974 water quality surveys, for the net effect of the algae was the supersaturation of water with dissolved oxygen. This portion of the segment can be considered more of a lake than a flowing stream, and lake monitoring techniques must be used to determine its water quality and the extent of eutrophication.

Segment 25 - Chocopee River, Red Bridge Dam to Wilbraham STP - Downstream of Red Bridge Dam the Chicopee River flows for over three miles with no point sources of pollution. Total coliform counts vary due to runoff and carryover from the previous segment, but average values collected during the 1974 survey were not high enough to constitute a violation of Class C standards.

Segment 26 - Chicopee River, Wilbraham to Ludlow Dam - A new sewage treatment facility discharges to the Chicopee River in the Town of Wilbraham. D.O. concentrations remain high because the discharge is small and highly treated. There were no violations of Class C criteria in this segment during the 1974 survey.

Segment 27 - Chicopee River, Ludlow Dam to Indian Orchard Dam - Below the Ludlow Dam the Chicopee receives several discharges from combined sewers as well as the discharge from the antiquated Ludlow STP. No stations were sampled in this segment during the 1974 water quality survey, but previous surveys showed high total coliform densities and some D.O. values below 5.0 mg/l in the Indian Orchard impoundment about a mile downstream of the Ludlow discharge.

Segment 28 - Chicopee River, Indian Orchard Dam to Chicopee Falls - This segment is the most grossly polluted segment in the entire Chicopee River Basin. In addition to combined sewer outfalls, the river receives large discharges from Monsanto Company's Bircham Bend and Springfield plants and the Indian Orchard STP (a primary treatment facility). The waters are odorous and highly colored with a variety of chemical and organic wastes. As the Chicopee River enters the swampy section above Chicopee Falls, D.O. values drop to zero. Total coliform densities and instream nutrient concentrations are also very high here.

Segment 29 - Chicopee Falls to confluence - Below Chicopee Falls, the Chicopee River continues to receive combined sewer discharges and industrial process water. The water quality remains severely degraded due to carryover from the previous segment, in addition to the effects from the new discharges. The only significant difference from the previous segment is that the stream's dissolved oxygen recovers considerably due to dam reaeration and a faster stream velocity.

TABLE 5

CHICOPEE RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Ware River	Above MDC intake	Above 29.1	4.9	A	A
2	Ware River	MDC intake to South Barre	29.1-27.3	1.8	B	B
3	Ware River	South Barre to Prince River	27.3-26.4	0.9	C	B
4	Ware River	Prince River to Wheelwright Dam	26.4-23.3	3.1	C	C
5	Ware River	Wheelwright Dam to Hardwick STP	23.3-15.6	7.7	C	C
6	Ware River	Hardwick STP to Ware Dam	15.6-12.2	3.4	C	C
7	Ware River	Ware Dam to Gibbs Crossing	12.2-8.8	3.4	U	C
8	Ware River	Gibbs Crossing to Thorndike Dam	8.8-3.2	5.6	U	C
9	Ware River	Thorndike Dam	3.2-0.0	3.2	U	C
10	Prince River	Entire length	8.4-0.0	8.4	B	B
11	Swift River	Above Winsor Dam	Above 9.8	--	A	A
12	Swift River	Winsor Dam to Bondsville	9.8-4.4	5.4	B	B
13	Swift River	Bondsville to confluence	4.4-0.0	4.4	C	B
14	Seven Mile River	Above Spencer STP	Above 2.4	7.1	B	B
15	Seven Mile River	Spencer STP to confluence	2.4-0.0	2.4	U	B
16	East Brookfield River	Source to Quaboag Pond	1.7-0.0	1.7	C	B
17	Quaboag River	Above Route 67 bridge	24.9-19.2	5.7	B	B

TABLE 5 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
18	Quaboag River	Route 67 bridge to Warren STP	19.2-13.1	6.1	B	B
19	Quaboag River	Warren STP to Route 32 bridge	13.1-5.1	8.0	B	B
20	Quaboag River	Route 32 bridge to confluence	5.1-0.0	5.1	C	B
21	Dunn Brook	Above North Brookfield STP	Above 3.3	1.0	B	B
22	Dunn Brook	North Brookfield STP to confluence	3.3-0.0	3.3	U	B
23	Chicopee Brook	Entire length	---	1.0	B	B
24	Chicopee River	To Red Bridge Dam	17.9-15.2	2.7	C	C
25	Chicopee River	Red Bridge Dam to Wilbraham STP	15.2-11.7	3.5	C	C
26	Chicopee River	Wilbraham STP to Ludlow Dam	11.7-9.3	2.4	C	C
27	Chicopee River	Ludlow Dam to Indian Orchard Dam	9.3-7.8	1.5	U	C
28	Chicopee River	Indian Orchard Dam to Chicopee Falls	7.8-3.0	4.8	U	C
29	Chicopee River	Chicopee Falls to confluence	3.0-0.0	3.0	U	C

Total Miles of Class A - 4.9
Total Miles of Class B - 44.5
Total Miles of Class C - 34.9
Total Miles of Unsatisfactory Conditions - 27.2

CONNECTICUT RIVER BASIN

Present Conditions

Segment 1 - Massachusetts-New Hampshire Line to Northfield Reservoir Intake- This segment meets all requirements for Class B criteria except for coliform. The levels for this parameter are quite high here. This station indicates the condition of the Connecticut River as it enters Massachusetts. Discharges of untreated and partially treated wastes into the Connecticut River and its tributaries in New Hampshire and Vermont are responsible for the high coliform levels in this segment.

Segment 2 - Northfield Intake to Millers River - This segment meets all Class B criteria except for coliform. The high coliform levels are carried over from segment one into this segment. The intake and discharge points for the Northfield pumped storage project are located at the top of this segment. To date no adverse effects on water quality have occurred as a result of the operation of this project.

Segment 3 - Millers River to Turners Falls Backwater - Again, this segment meets all Class B criteria except for coliform levels. The only major discharge into this segment is the waste carried by the Millers River. This is heavily diluted by the much larger flows in the Connecticut River and does not have a significant effect on the water quality in this segment. The coliform problems from segments one and two are carried into this segment. Additional coliform enter this segment from the Millers River.

Segment 4 - Turners Falls Backwater to Turners Falls Dam - This is the pond backed up behind the Turners Falls Dam. The large volume of water in this segment serves to dilute the wastes which are carried into it from upstream segments. There are no direct discharges into this segment. The water quality here is very close to Class B levels. In 1973 the coliform levels in this segment met B criteria in September, but did not meet them in August.

In 1973 a photsynthesis station located in this segment indicated that there was significant photosynthetic activity in this reach. This segment should meet Class B criteria when secondary treatment facilities are completed on the Millers River.

Segment 5 - Turners Falls to Deerfield River - During the summer, most of the flow in the Connecticut River bypasses this segment. Water is diverted to the Turners Falls power canal at the start of this segment and flows back into the river near the end of this segment. Coliform levels in this reach exceed established Class B levels. The high coliform levels are caused by discharges into the Turners Falls Power canal from sewer overflows and storm drains located in the Village of Turners Falls.

Segment 6 - Deerfield River to South Deerfield Treatment Plant - This long segment meets all water quality criteria for a Class B stream with the exception of coliform levels. The recent completion of the Greenfield Wastewater Treatment Plant should serve to alleviate most of this problem. The primary treatment facility for Turners Falls discharges into this segment and causes some increase in the coliform levels in this segment.

Segment 7 - South Deerfield Sewage Treatment Plant to Amherst Outfall - This segment meets Class B criteria.

Segment 8 - Amherst Outfall to above the Oxbow - All Class B criteria with the exception of coliform levels are met in this segment. The badly overloaded Amherst Sewage Treatment Plant is the major contributor to this problem. Untreated domestic sewage from Hatfield is also discharged into this segment. Nutrient levels are high in this segment and a photosynthesis station located here in 1973 indicated that some photosynthetic activity occurred in this segment.

Segment 9 - Above Oxbow to below Oxbow - This small segment receives the discharge from the Northampton primary treatment facility. Consequently, coliform levels are very high in this segment. Nutrient levels also increase significantly in this segment. This segment meets Class B criteria except for coliform levels.

Segment 10 - Below Oxbow to South Hadley Backwater - The discharge from the Easthampton treatment facility enters this segment. Also the Northampton discharge affects this segment. Coliform levels are far above Class B criteria. Nutrients continue to be high. This segment meets all Class B criteria except for coliform levels.

Segment 11 - South Hadley Backwater to South Hadley Dam - This segment is the pond behind the Holyoke Dam. At this time the sewage discharges into this segment from Holyoke have been eliminated. However, sewer overflows from South Hadley discharge into this segment. Coliform levels are well above Class B criteria and nutrients remain high. In 1973 a major algal bloom occurred in this impoundment during the September water quality survey on the Connecticut River. This segment does not meet Class B criteria.

Segment 12 - South Hadley Dam to Holyoke Sewage Treatment Plant - In this segment, coliform levels jump into the hundreds of thousands, nutrients reach very high levels, levels of toxic metals become significant, BOD levels increase significantly, and dissolved oxygen levels violate Class C criteria. Combined sewers from Holyoke and South Hadley, industrial discharges, and the effluent from the South Hadley primary sewage treatment plant all contribute to the degradation of the water quality in this segment. This segment does not meet Class C criteria.

Segment 13 - Holyoke Sewage Treatment Plant to Chicopee River - This segment receives the bulk of the combined sewer discharges from Holyoke and Chicopee. Also, the discharges from the Holyoke and Chicopee primary treatment facilities enter this segment. A number of major industrial discharges affect this segment also. Coliform levels remain high in this segment. Dissolved oxygen levels do not meet Class C criteria. Nutrients, oil, floating solids, and toxic metals all contribute to the degradation of the water quality in this segment. This segment is well below Class C criteria.

Segment 14 - Chicopee River to Springfield Sewage Treatment Plant - This segment is degraded by wastes carried to it by the Chicopee River. Effects from upstream waste discharges continue to be felt in this segment and combined sewer overflows from Springfield and Chicopee further degrade the water quality in this segment. All significant water quality parameters indicate that this segment is severely polluted. This segment is well below Class C criteria.

Segment 15 - Springfield Sewage Treatment Plant to Westfield River - This short segment is grossly polluted by the discharge from the Springfield Regional Treatment Plant at Bondi Island. The heated discharge from Northeast Utility's West Springfield generating station further degrades the water quality in this segment. Most significant water quality parameters increase to their highest levels on the Connecticut River in this segment and dissolved oxygen values decrease to levels well below Class C criteria. This segment obviously does not meet Class C criteria.

Segment 16 - Westfield River to Leonard Street - The water quality in this segment continues to be seriously degraded. This segment does not receive any additional waste discharges, but is affected by the major waste discharges into the segments above it. Coliform levels, nutrients, floating solids, and oil are all problems. In addition, dissolved oxygen levels are unacceptably low. This segment is well below Class C criteria.

Segment 17 - Leonard Street to Riverside Park - The upstream discharges continue to seriously degrade the water quality of the Connecticut River in this segment. All significant water quality parameters are at unacceptable levels in this segment. The water quality in this segment is well below Class C criteria.

Segment 18 - Riverside Park to Massachusetts-Connecticut State Line - The water quality in this segment begins to show improvement. However, it is still below Class C criteria. Dissolved oxygen levels continue to violate the C classification assigned to this segment. Nutrients, coliform levels, oil, and floating solids from upstream discharges all contribute to the degradation of the water quality in this segment. There are no known pollutional discharges into this segment.

TABLE 7

CONNECTICUT RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Connecticut River	Mass.-Vt.-N.H. state line to Northfield Reservoir intake	138.2-128.8	9.4	C	B
2	Connecticut River	Northfield intake to Millers River	128.8-127.7	1.1	C	B
3	Connecticut River	Millers River to Turners Falls backwater	127.7-126.0	1.7	C	B
4	Connecticut River	Turners Falls backwater to Turners Falls Dam	126.0-123.8	2.2	C	B
5	Connecticut River	Turners Falls Dam to Deerfield River	123.8-120.5	3.3	C	B
6	Connecticut River	Deerfield River to Sunderland STP	120.5-112.0	8.5	C	B
7	Connecticut River	Sunderland STP to Amherst outfall	112.0-106.5	5.5	B	B
8	Connecticut River	Amherst outfall to above Oxbow	106.5-94.0	12.5	C	B
9	Connecticut River	Above Oxbow to below Oxbow	94.0-93.1	0.9	C	B
10	Connecticut River	Below Oxbow to South Hadley backwater	93.1-88.3	4.8	C	B
11	Connecticut River	South Hadley backwater to South Hadley Dam	88.3-86.6	1.7	C	B
12	Connecticut River	South Hadley Dam to Holyoke STP	86.6-83.7	2.9	U	C
13	Connecticut River	Holyoke STP to Chicopee River	83.7-80.7	3.0	U	C

TABLE 6 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
14	Connecticut River	Chicopee River to Springfield STP	80.7-75.6	5.1	U	C
15	Connecticut River	Springfield STP to Westfield River	75.6-75.2	0.4	U	C
16	Connecticut River	Westfield River to Leonard Street	75.2-73.1	2.1	U	C
17	Connecticut River	Leonard Street to Riverside Park	73.1-71.5	1.6	U	C
18	Connecticut River	Riverside Park to Mass.-Conn. state line	71.5-70.7	0.8	U	C

Total Miles of Class B - 5.5
Total Miles of Class C - 46.1
Total Miles of Unsatisfactory Conditions - 15.9

DEERFIELD RIVER BASIN

Present Condition

Segment 0 - Mass.-Vt. state line to Sherman Dam - The only discharge into this segment is the heated cooling water from the Yankee Atomic Plant at Rowe. This does not cause a violation of Class B criteria. At this time, this segment is meeting its B classification.

Segment 1 - Sherman Dam to Bear Swamp - This segment has been given a C classification. During the 1973 water quality survey in the Deerfield basin, this segment met the criteria for this classification. The only discharges into this reach are the treated effluents from the Deerfield Specialty Paper Company and the Monroe Bridge STP. This segment may also be affected by the upstream discharge of heated water from the Yankee Atomic Plant at Rowe. The impoundment created as part of the Bear Swamp Pumped Storage Project will inundate several miles of this segment. The effect of this impoundment on the water quality in this segment is currently being studied. Possible upgrading of this segment from a C to a B classification will be considered when these studies have been completed and the results reviewed by this Division.

Segment 2 - Bear Swamp to Cold River - This segment runs through rural, sparsely settled woodlands. It is classified as B water and meets this classification except for occasional coliform violations. In 1973, this segment violated Class B criteria on only one of four days on which it was sampled for coliform.

Segment 3 - Cold River to Charlemont - This segment meets all Class B criteria with the exception of coliform levels. This violation is serious and is caused by numerous individual discharges of untreated domestic sewage from homes in Charlemont. This segment will continue to violate Class B criteria until state and local officials locate these illegal discharges and require the local home owners to provide adequate treatment for them.

Segment 4 - Charlemont to below Route 2 bridge - This segment meets its B classification except for occasional coliform level violations. The coliforms are carried into this segment from the previous segment. The completion of the above noted enforcement program in Charlemont will eliminate the minor coliform problems which exist in this segment.

Segment 5 - Below Route 2 bridge to North River - This small segment has been assigned a B classification and fully meets the criteria for this classification. There are no pollutional discharges into this segment.

Segment 6 - North River to Dam 4 - This segment meets all Class B criteria.

Segment 7 - Dam 4 to Dam 3 - This segment is meeting Class B criteria.

Segment 8 - Dam 3 to Dam 2 - This segment also meets all Class B criteria.

Segment 9 - Dam 2 to Stillwater Bridge - This long segment flows through a very sparsely settled area. The water quality here does not meet Class B criteria for coliform levels. Some of the coliform in this reach are carried into it from upstream discharges in Buckland and Shelburne Falls. Untreated

domestic sewage discharges from homes in Ashfield are carried into this segment by the South River. Finally, the land along the river banks in the lower end of this segment is used as pasture land. Large numbers of coliform may be carried into this segment by overland runoff during rain storms. This segment meets all other Class B criteria.

Segment 10 - Stillwater Bridge to Deerfield Academy - Again, this segment meets all Class B criteria with the exception of coliform levels. This violation may be caused by overland runoff from dairy farms located along the banks of this segment. This is considered to be a non-point source of pollution. Coliform carried into this segment from upstream discharges further increase the high coliform levels in this segment.

Segment 11 - Deerfield Academy to Green River - This segment also fails to meet Class B criteria for coliform levels. This violation is caused by upstream discharges which are carried into the segment and by the discharge from the Old Deerfield STP. All other Class B criteria are met by the water quality in this segment.

Segment 12 - Green River to Connecticut River - This segment is meeting Class B criteria.

Segment 13 - North River: above North River Cemetery and West Branch North River - This segment has been designated as an anti-degradation segment. At present, it does not meet this designation because a few individual homes are discharging domestic wastes into it. This segment will not meet its designation until local health officials locate and eliminate these discharges. However, the water quality in this segment does meet its assigned B classification.

Segment 14 - North River Cemetery to West Branch, North River - This segment is classified as B water and meets the criteria for this classification. The only slight problem is coliform bacteria. These come from discharges of domestic sewage from homes. The levels in this segment do not violate Class B criteria but indicate that some sources of pollution which will have to be located and eliminated do exist in this segment.

Segment 15 - West Branch North River to Shattuckville gage - This segment has been given a C classification. At present, this segment meets this classification all of the time and routinely meets a B classification, except for occasional coliform violations. The treatment facility serving Kendall Fiber Products and the Village of Griswoldville discharges a high quality effluent into this segment. When this treatment facility is operating properly, the effluent has little effect on the water quality in this segment. The minor coliform violations noted will be eliminated, and it will be recommended that this segment be upgraded to a B classification.

Segment 16 - Shattuckville gage to Deerfield River - This segment has been given a C classification. At present time, it meets all criteria for a B classification except for occasional coliform violations. There are no known pollutional discharges into this segment. As with segment 2, these discharges will be eliminated and it will be recommended that this segment be upgraded to a B classification.

Segment 17 - Green River above Silver Street bridge - This is an anti-degradation segment with a B classification. It fully meets its B classification at this time.

Segment 18 - Silver Street bridge to Greenfield STP - This segment fully meets its C classification during the 1973 water quality survey on this river. However, coliform levels were not adequate for a B classification. A major upgrading of the Greenfield sewer system has recently been completed. This included the elimination of several sewer overflows into this segment. It is expected that this segment will meet Class B criteria during the next water quality survey. It is recommended that this segment be upgraded to a B classification.

Segment 19 - Greenfield STP to Deerfield River - During the 1973 water quality survey in the Deerfield basin, this short segment was grossly polluted by the discharge from the Greenfield primary treatment facility. Coliform levels, floating solids, and phosphorus levels all violated Class C criteria in this segment. Therefore, this segment was not meeting its classification in 1973. This segment is the only water quality limited segment in the Deerfield Basin. The Greenfield facility has recently been upgraded to secondary treatment. It is expected that the next water quality survey in the basin will determine that this segment is meeting its assigned C classification. However, calculations indicate that, with the present level of treatment, this segment may not meet Class C criteria during the 7-day, 10-year low flow.

TABLE 7

DEERFIELD RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
0	Deerfield River	Above Sherman Dam	Above 41.9	1.0	B	B
1	Deerfield River	Sherman Dam to Fife Brook Dam	41.9-37.8	4.1	C	C
2	Deerfield River	Fife Brook Dam to Cold River	37.8-29.3	8.5	B	B
3	Deerfield River	Cold River to Charlemont	29.3-24.9	4.4	C	B
4	Deerfield River	Charlemont to below Rte. 2 bridge	24.9-18.7	6.2	C	B
5	Deerfield River	Below Rte. 2 bridge to North River	18.7-18.2	0.5	B	B
6	Deerfield River	North River to Dam 4	18.2-16.3	1.9	B	B
7	Deerfield River	Dam 4 to Dam 3	16.3-15.3	1.0	B	B
8	Deerfield River	Dam 3 to Dam 2	15.3-13.4	1.9	B	B
9	Deerfield River	Dam 2 to Stillwater Bridge	13.4-7.6	5.8	C	B
10	Deerfield River	Stillwater Bridge to Deerfield Academy	7.6-4.5	3.1	C	B
11	Deerfield River	Deerfield Academy to Green River	4.5-2.0	2.5	C	B
12	Deerfield River	Green River to Connecticut River	2.0-0.0	2.0	C	C
13	North River	Above North River Cemetery and West Branch, North River	Above 6.2	16.3	B	B

TABLE 7 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
14	North River	North River Cemetery to West Branch, North River	6.2-3.1	3.1	B	B
15	North River	West Branch, North River to Shattuckville gage	3.1-1.1	2.0	B	C
16	North River	Shattuckville gage to Deerfield River	1.1-0.0	1.1	B	C
17	Green River	Above Silver Street bridge	Above 3.5	1.0	B	B
18	Green River	Silver Street bridge to Greenfield STP	3.5-0.5	3.0	C	C
19	Green River	Greenfield STP to confluence	0.5-0.0	0.5	U	C

Total Miles of Class B - 38.3
Total Miles of Class C - 31.1
Total Miles of Unsatisfactory Conditions - 0.5

Present Conditions

Segment 1 - Outlet, Shaw Pond to 1,000 feet upstream from the Mass.-Conn. state line - The first station sampled in 1974 (FA01 was at the outlet of a swamp below Hayden Pond. Experience with water quality in swamps has shown that the slight violation which may occur in the dissolved oxygen criteria, in this case for a cold-water fishery criterion, is the result of natural phenomena. The BOD_5 recorded at this station was slightly higher in August than during June (2.4 mg/1 vs. 1.4 mg/1). This can be attributed to a lower flow. All other parameters were meeting established criteria for Class B waters.

Segment 2 - 1,000 feet upstream from Mass.-Conn. state line to state line - Station FA02 was located in Otis Center where the river had become wider and momentarily slower-moving. Higher total coliform counts were recorded during the 1974 survey (1,100 col/100 ml. and 1,300 col/100 ml.). It is felt that many of these coliform were from the runoff caused by the thunderstorms that preceded these two sampling dates. Other coliform samples as well as all other parameters tested easily met Class B criteria.

Stations FA04, FA05, and FA06 were all characterized by a rapid and shallow flow. Because of this, the D.O. stayed well above the 75% saturation value required by the Class B criteria. High total coliform values were also due to runoff caused by the storms. All other parameters tested were in accordance with Class B criteria.

Segment 4 - All streams of Farmington River Basin up to 1,000 feet upstream of Mass.-Conn. stateline - Station FA04A, located on Fall River, showed clean water values meeting all Class B criteria.

Segment 5 - All other waters at the Farmington River Basin - This segment includes Benton Brook and the Clam River. These stations also showed values reflecting good water quality.

TABLE 8

FARMINGTON RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Farmington River	Outlet, Shaw Pond to 1,000 feet upstream from the Mass.-Conn. state line	17.4-0.2*	17.2	B	B
2	Farmington River	1,000 feet upstream from the Mass.-Conn. state line to the state line	0.2*-0.0	0.2	A	A
3	Fall River	Big Pond, Otis Reservois, Fall River	1.0**-0.0	1.0	B	B
4	All streams of the Farmington River Basin up to 1,000 feet upstream of the Mass.-Conn. state line		---	---	A	A
5	All other waters of the Farmington River Basin		---	---	B	B

Total Miles of Class A - 0.2
Total Miles of Class B - 18.2

* Mileage from state line.
** Mileage from Farmington River.

FRENCH AND QUINEBAUG RIVER BASIN

Present Condition

Segment 1 - Quinebaug River above Sturbridge STP - Samples collected in this segment in 1976 show no existing water quality problems. This segment is classified as AD since it is upstream of all existing discharges.

Segment 2 - Sturbridge STP to Cady Brook - Slightly high nutrients were observed just below the treatment plant. Coliform bacteria were slightly high at the end of the segment, probably due to urban runoff. This segment is classified EL since, at this time, criteria are being met. Increased flows at Sturbridge could result in a change to WQ.

Segment 3 - Cady Brook to Southbridge STP - Class C criteria are essentially met. Occasional discoloration occurs, due to treated effluent from American Optical. Biological study indicated only pollution-tolerant organisms. This is attributed to urban runoff in Southbridge. This segment is classified EL since standards are met when the American Optical treatment facility is functioning properly.

Segment 4 - Southbridge STP to West Dudley - High coliform bacteria, nutrients, and solids were observed below the treatment plant outfall. D.O. was somewhat low. Nutrient problems continue into the next segment. This segment is classified WQ since advanced waste treatment at Southbridge will be required to solve the nutrient problems.

Segment 5 - West Dudley to state line - D.O. and solids problems are caused by the West Dudley Paper discharge. Nutrient problems continue from Segment 4.

Segment 6 - Cady Brook above Charlton City - No problems were observed in this segment. Since it is upstream of all waste discharges, it is subject to the anti-degradation provision.

Segment 7 - Charlton City to Quinebaug River - Severe coliform, D.O., solids, and nutrient problems are caused by the discharges from Charlton Woolen and the Charlton City STP. Advanced waste treatment will be necessary to solve these problems; the segment is therefore classified WQ. Cady Brook recovers from these discharges and has no adverse effects on the Quinebaug River.

Segment 8 - French River (Town Meadow Brook) above Leicester Center STP - No evidence exists of any problems here. This segment is classified as AD.

Segment 9 - Leicester STP to Massachusetts Turnpike - Slight D.O., coliform, solids, and nutrient problems in this segment are attributed to the treatment plant discharge. The segment is classified WQ since advanced waste treatment will be necessary. Chlorides problems may be caused by a road salt storage area.

Segment 10 - Massachusetts Turnpike to Mill Brook - Moderate coliform, D.O., solids, and nutrients at the upper end of this segment were caused by untreated discharges from Carleton Woolen and the Village of Rochdale. A treatment facility for these wastes was recently completed. Provision of

best practicable treatment at this facility should solve the problems in the segment; the segment is therefore classified EL.

Segment 11 - Mill Brook to Webster and Dudley STPs - Discharges from Cranston Print Works and Anglo Fabrics were connected to Webster sewer system, resulting in significant improvements in this segment. The segment is classified WQ since individual BPT at the industries would probably not result in the attainment of water quality standards.

Segment 12- Webster and Dudley STPs to state line - Severe solids, D.O., coliform, nutrients result from the two treatment plants as well as discharges to the previous segment. This segment, as well as the next two, is classified WQ since advanced waste treatment will be necessary to solve the existing problems.

Segment 13 - State line to Sunset Hill Brook - Problems from the previous segment continue into this segment. There are no known discharges to this segment in Connecticut.

Segment 14 - Sunset Hill Brook to Quinebaug River - Coliform and solids improve somewhat; other problems from the upstream segments continue. The Thompson, Conn., STP discharges into this segment. There are no discernible effects caused by the discharge from this small treatment facility.

TABLE 9

FRENCH AND QUINEBAUG RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Quinebaug River	Hamilton Reservoir to Sturbridge STP	Above 19.7	11.0	B	B
2	Quinebaug River	Sturbridge STP to Cady Brook	19.7-13.4	6.4	B	B
3	Quinebaug River	Cady Brook to Southbridge STP	13.4-12.2	1.2	C	C
4	Quinebaug River	Southbridge STP to West Dudley	12.2-10.1	2.1	U	C
5	Quinebaug River	West Dudley to state line	10.1-8.0	2.1	U	C
6	Cady Brook	Outlet of Glen Echo Lake to Charlton City	6.1-5.1	1.0	B	B
7	Cady Brook	Charlton City to Quinebaug River	5.1-0.0	5.1	U	C
8	French River	Sargent Pond to Leicester STP	27.7-27.0	0.7	B	B
9	French River	Leicester STP to Mass. Pike	27.0-22.2	4.8	C	B
10	French River	Mass. Pike to Mill Brook	22.2-10.8	11.4	C	B
11	French River	Mill Brook to Webster-Dudley STP	10.8-8.0	2.8	C	C
12	French River	Webster-Dudley STP to state line	8.0-7.1	0.9	U	C
13	French River	State line to Sunset Hill Brook	7.1-2.2	4.9	U	C
14	French River	Sunset Hill Brook to Quinebaug River	2.2-0.0	2.2	U	B

Total Miles of Class B - 19.1
Total Miles of Class C - 20.2
Total Miles of Unsatisfactory Condition - 17.3

HOOSIC RIVER BASIN

Present Conditions

Segment 1 - Massachusetts-Vermont State line to the Clarksburg-North Adams Town line - The major problems of this section stem from illegal entry of raw sewage to the North Branch. At the present time, there is no centralized sewer system in the Town of Clarksburg. Since many of the portions of town are not suited for subsurface disposal, domestic sewage enters the North Branch either directly or through seepage. This pollution causes violations in coliform standards. There are no industries within this section that discharge wastewater to the river. This segment has a future use classification of B but due to the high coliform counts, its present condition is C.

Segment 2 - Clarksburg-North Adams town line to the confluence with the South Branch - With the elimination of the industrial discharges since 1969, there are no known point sources of pollution in this segment. However, the outfalls in Clarksburg, as mentioned in Segment 1, are still being reflected in this section's high coliform counts. These counts are not high enough to violate this segment's C classification, but they do prevent an upgrading to B.

Segment 3 - Outlet of Cheshire Reservoir to the Adams WTP - In this segment, the South Branch receives minor seepage from sub-surface disposal units in Cheshire, along with a batch discharge of treated industrial wastewater from the Berkshire Screw Machine Company. The effects of this pollution on the river immediately below the outfalls cannot be accurately determined without a series of special studies. The South Branch had assimilated these wastes by the time it was monitored in southern Adams. The parameters sampled at that station reflected levels typical of clean water conditions. According to the best available data, this segment was meeting its future use classification of B in 1973.

Segment 4 - Adams WTP to the confluence with the North Branch - Within this segment, the South Branch receives the treated effluent from the Adams WWTP and the Charles Pfizer Lime Company, as well as the highly concentrated runoff from the Adams dump. Of these three sources, the Adams facility and the Adams dump represent water quality problems. The failure of the Adams WWTP to reach operational efficiency has created high organic, solids, color, and turbidity concentrations within the river. In addition to this, their inadequately dewatered sludge is being disposed of directly beside the river, causing runoff to the river and the possibility of washout during high flows. The Adams dump, according to the waste discharge data of 1973, was adding substantial amounts of organics, solids, nitrates, and metals to the river. There is one other source of pollution within this segment--the Holland Chemical Company. Their treatment facility, which should not have an outfall, often discharges during wet weather. The severity of all these additions is further compounded by their location in reference to the headwaters. The low flow in the Hoosic at this point supplied only a limited dilution capacity, which created a critical water quality situation. The dissolved oxygen concentrations, however, did not reflect the oxygen loss from the presence of the pollution, due to the offsetting effect of high surface aeration. This segment, due mainly to the Adams WWTP and the Adams dump, did not meet its future use classification of C and is, therefore, considered to be U.

Segment 5 - Confluence with the North Branch to the North Adams STP- The major source of pollution within this segment is the untreated outfalls from the Sprague Electric Company. The water quality in this section is also dependent upon the condition of the outfalls discussed in segments 1 and 4. The combined effects of this pollution were reflected in the following water quality parameters: coliform, D.O., solids, color, metals, and nutrients. Specific additions from Sprague Electric include nitrate-N, total phosphorus, and aluminum. The problems within this segment are further complicated by the development of the river channel for flood control. The concrete channel creates a shallow depth and extreme velocities, along with providing an ideal medium for algal growth. At the end of this channel, a velocity-reducing pool acts as an impoundment which, in turn, stimulates algal production in the nutrient-rich river. Diurnal fluctuations due to algal activity result in low D.O. concentrations at night. The combined effects of the upstream discharges and the environment created by the flood control structure cause violations in the water quality criteria for this segment's future use classification of C. This segment is, therefore, presently considered to be U.

Segment 6 - North Adams STP to the re-entrance of the Widen Tannery Diversion - The additions of organics, solids, coliforms, and nutrients from the North Adams primary STP dominate the water quality in this segment. This discharge, besides making the Hoosic aesthetically poorer, placed an overpowering demand on the free oxygen in the river. Almost immediately, the dissolved oxygen concentrations began to decrease. The high coliform counts reflected the inadequate primary treatment at this facility and the failure of the facility to chlorinate. Violations in the water quality criteria, caused by the North Adams STP, prevented this segment from meeting its future use classification of C. This segment is presently considered to be U.

Segment 7 - Re-entrance of Widen Tannery Diversion to the Williamstown STP - A short distance below the North Adams STP, the Hoosic River receives the wastes from Widen Tannery. Together, these two sources create severe water quality problems in the river for the remaining distance in Massachusetts. The most dominant characteristics of the Widen discharge are the vivid color changes which, in turn, control the color of the river, and the unpleasant odor, which remains with the river for many miles. Other additions from the tannery include major chromium, solids, and organic concentrations. The combined effect of these two discharges has created violations of the D.O. criteria. This segment is presently considered to be U, due to the failure of the Hoosic to meet the future use classification of C.

Segment 8 - Williamstown STP to Route 364 bridge in Pownal, Vermont - Within this segment, the Hoosic receives the primary outfall from the Williamstown STP. This STP, along with the discharges in segments 6 and 7, dominates the water quality. Midway through this segment, the Hoosic reaches its lowest D.O. concentration, which is far below the minimum allowable for this segment's future use classification of C. Coliform counts continue to reflect the municipal facilities in Williamstown and North Adams. It is only as the Hoosic leaves Massachusetts that the river's water quality shows signs of recovery from the North Adams outfalls. This section is presently considered to be U.

Segment 1T - Green River from the Springs Restaurant in New Ashford to the confluence with the Hoosic River - The Green River receives wastewater pollution from a number of sources, including the treated outfalls from the Springs Restaurant, the Mt. Greylock Regional High School, and individual raw sewage discharges from adjacent homes. Upstream reaches have not been monitored. Results from samples taken near the confluence indicate the

Green River's ability to assimilate the upstream wastes. The effects of the discharges on the river immediately below their point of entry cannot be determined without further investigation. According to the best available data, this segment was meeting its future use classificaion of B in 1973.

TABLE 10

HOOSIC RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	North Branch, Hoosic River	From Mass.-Vt. state line to Clarksburg-North Adams town line	Above 10.0, 2.3	7.6	C	B
2	North Branch, Hoosic River	Clarksburg-North Adams town to confluence with South Branch, Hoosic River	10.0,2.3-10.0,0.0	2.3	C	C
3	South Branch, Hoosic River	From the outlet of Cheshire Reservoir to the Adams STP	23.5-15.4	8.1	B	B
4	South Branch, Hoosic River	From the Adams STP to the confluence with the North Branch, Hoosic River	15.4-10.3	5.1	U	C
5	Hoosic River	From the confluence with the North Branch to the North Adams STP	10.3-7.4	2.9	U	C
6	Hoosic River	From the North Adams STP to re-entrance of Widen Tannery diversion	7.4-6.7	0.7	U	C
7	Hoosic River	From the re-entrance of Widen Tannery Diversion to the Williamstown STP	6.7-3.7	3.0	U	C
8	Hoosic River	From the Williamstown STP to Route 364 bridge, Pownal, Vt.	3.7-0.0	3.7	U	C
1T	Green River	From the Springs Restaurant, New Ashford, to confluence	5.6,9.2-	9.2	B	B

Total Miles of Class B - 17.3
Total Miles of Class C - 9.9
Total Miles of Unsatisfactory Condition - 15.4

HOUSATONIC RIVER BASIN

Present Conditions

Segment 1 - Headwaters to Old Windsor Road - The East Branch from its source to Old Windsor Road in Dalton receives pollution from Hinsdale in the form of raw domestic sewage. There are a number of outfalls lining the East Branch, from Hinsdale Center downstream towards Dalton. This pollution is best reflected in coliform counts which are high enough to violate criteria and prevent this segment from meeting its future use classification of B. This section is presently considered to be C.

Segment 2 - Old Windsor Road to Crane Paper Co. WTP - There are no known sources of pollution in this segment. There is a slight oxygen demand within Center Pond which is believed to be a direct result of the decomposition of vegetative matter brought naturally to the pond from upstream runoff. At this point along the East Branch, the pollution from the outfalls in Hinsdale is no longer a factor affecting the river's water quality. This segment is meeting its future use classification of B.

Segment 3 - Crane Paper Co. WTP to confluence with Unkamet Brook - The effluent from the Crane Paper Company's WWTP is discharged at the upstream reach of this segment. The quality of this discharge is critical due to the limited assimilative capacity available. Results from the 1974 survey indicated that the treatment provided did not allow the East Branch to meet the water quality criteria for its C classification. Violations in the D.O. values occurred downstream from the outfall. This segment is presently considered U.

Segment 4 - Confluence with Unkamet Brook to Newell St. - Two outfalls from the General Electric Company discharge into this segment. One of the outfalls is treated by an oil separator and the other by a chemical retention pond prior to discharge to Unkamet Brook. This brook runs a very short distance south before joining the East Branch. The wastewater from G.E. is unlike the typical discharge from a sewage treatment plant or paper company. Therefore, many of the parameters used to describe the treatment plants' or paper companies' wastewater are not applicable here. Overall, the addition of these two discharges compounded the problems in the East Branch. The most critical problem was the reduction in D.O. The low D.O. levels caused violations in the criteria which prevented this segment from meeting its future use classification of C. This section is presently classified U.

Segment 5 - Newell St. to confluence with West and Southwest Branches - The G.E. Company has three other major discharges which enter the East Branch. These discharges are run through oil separators before entering the river at the upper reach of this segment. This wastewater, like that entering Segment 4, is unlike the effluent from a sewage treatment facility. There was a continued violation of the D.O. criterion in this segment. In addition, significant increases in the instream phosphorus concentrations occurred. An oil film appeared within this segment. The cause of the oil film was traced to a non-point source. The combined effects of G.E., Crane Paper Company, and various non-point sources prevented this segment from meeting its future use classification of C. This segment is presently referred to as U.

Segment 6 - Confluence with West and Southwest Branches to Pittsfield STP - The West and Southwest Branches meet the East Branch at the beginning of this reach and form the main stem Housatonic. There are no point sources of pollu-

tion entering this segment. The two branches entering from the west were meeting their assigned future use classification of C, although data indicated that some pollution had entered these rivers in an upstream reach. Overall, the additions to the East Branch from the West and Southwest Branches were relatively small. The wastes in the East Branch continued to dominate the water quality of the Housatonic. Violations of the D.O. criterion prevented this segment from meeting its C classification; this results in a present condition of U.

Segment 7 - Pittsfield STP to No. Lenox STP - The major source of pollution in this segment is the Pittsfield WWTP. This plant provides secondary treatment for only part of the influent flow. The flow exceeding 10 MGD is discharged directly after primary treatment. There are no chlorination facilities at any of the outfalls. The loading from this facility is the largest encountered on the Housatonic River in Massachusetts. The combined effect of this wastewater and the wastewater from upstream reaches which has not yet been assimilated is reflected in the poor water quality of the Housatonic in this segment. The D.O. violations occurred throughout the day. High coliform counts reflected the plant's failure to chlorinate. In addition to these two parameters, the introduction of large quantities of nutrients, although not causing any immediate problems in this section, did contribute to severe water quality conditions in later reaches. The Housatonic, due for the most part to the Pittsfield WWTP and to a lesser degree to the East Branch outfalls, is not meeting its future use classification of C and is, therefore, considered to be U.

Segment 8 - North Lenox STP to inlet Woods Pond - The section of river in this segment is directly upstream from Woods Pond. The pond's influence on the river's velocity was already evident. There was a small, inadequately treated discharge from the North Lenox STP at the beginning of this segment. However, any adverse effects from this outfall could not be clearly seen due to the dominance of upstream discharges. The oxygen demand from the instream pollutional load produced the lowest D.O. levels recorded on the Housatonic in 1974. The criteria for a Class C stream continued to be violated in this segment, resulting in a present condition of U.

Segment 9 - Inlet Woods Pond to Lenox Center STP - This segment includes Woods Pond from its inlet to its outlet. Because of the location below the major discharges from Pittsfield and Dalton, the pond serves as a catch basin for the upstream wastewater. The abundance of instream nutrients entering the pond stimulates algal growth. During the summer months of high algal activity, the populations grow to bloom proportions. This heavy growth causes D.O. to reach supersaturation during the day and lows at night far below the minimum acceptable level. Due to many criteria violations, this segment is not meeting its C classification and is therefore considered to be U.

Segment 10 - Lenox Center STP to Lenoxdale STP - Just below the outlet of Woods Pond at the beginning of this segment, the Housatonic receives the treated wastewater from the Lenox Center STP. Since the treatment provided at this plant is more than adequate, there is no significant addition to the Housatonic's pollutional load. The water quality, however, remains poor. Although the extreme D.O. fluctuations were not apparent here due to the change in velocity, the algal populations remained high. The river was very turbid here, and D.O. violations occurred frequently. The future use classification of C for this segment was not being met, resulting in a present condition of U. As is seen in this segment and is apparent in many downstream segments, the loading above Woods Pond, the activity within the pond,

and the quality of the pond's outlet control the river's present condition classification for many miles.

Segment 11 - Lenoxdale STP to P.J. Schweitzer Paper Co. STP - At the beginning of this segment, the Housatonic receives the treated effluent from the Lenoxdale STP. This plant's effluent is very much like the Lenox Center effluent in that it adds very little to the river's pollutional load. As the river nears the impoundment at P.J. Schweitzer, its velocity slows. The algae carried down from Woods Pond again become active and contribute to considerable D.O. violations during the night. This segment was not meeting its future use classification of C and is presently considered to be U.

Segment 12 - P.J. Schweitzer Paper Company STP to confluence with Goose Pond Stream - The P.J. Schweitzer Paper Company discharges its treated wastewater into the upstream reach of this segment. Since 1969, the company has provided its wastewater with secondary treatment or the equivalent thereof by constructing two treatment facilities. The construction of these facilities has led to a major decrease in this company's waste additions. However, the poor condition of the Housatonic as it enters this segment limits the expected improvement. Due in the most part to the discharges above Woods Pond and the resulting condition of the pond's outlet, this segment was not meeting the criteria for its C classification and is therefore considered to be U.

Segment 13 - Confluence with Goose Pond Stream to Lee STP - Within this segment the Housatonic receives Goose Pond Stream. In an upstream reach this tributary is subjected to the treated outfall from the Westfield River Paper Company. In 1974, however, the paper company's additions to the stream were not evident by the time the main stem of the Housatonic was reached. The river continues the slow process of assimilation in this segment. The moderate velocity of this segment prevented excessive algal activity. This, in turn, caused only slight D.O. decreases due to algal respiration at night. The Housatonic, for the first time since Dalton, did not violate its D.O. criterion. In fact, the 1974 data indicated that this segment was meeting its assigned classification of C.

Segment 14 - Lee STP to the Laurel Mill - The Lee STP discharges into this segment. At the present time, the outfall from this facility does not have any significant impact on the water quality of the river. Although a sampling station could not be located directly below the discharge, it is believed that the river was continuing to assimilate instream wastes and that conditions in this segment were similar to those found in Segment 13. Therefore, this segment is meeting its C classification.

Segment 15 - Laurel Mill to Willow Mill - The Laurel Mill of the Hurlbut Paper Company discharges its treated outfall into this segment. This discharge does not have a serious impact on the Housatonic's water quality. However, a short distance downstream, samples indicated violations in the D.O. criterion. This was attributed to the slowing down of the river as it approached the dam at the Willow Mill of the Hurlbut Paper Company. The impoundment provided an excellent flow condition for high algal activity. The respiration of algal populations at night along with the conversion of ammonia-nitrogen to nitrate-nitrogen produced the D.O. violations. Therefore, due to the wastes that had yet to be assimilated in upstream reaches and the reduction in the river's velocity, the Housatonic was not meeting its assigned

classification of C in this segment.

Segment 16 - Willow Mill to confluence with Kampoosa Brook - This short section of river receives the treated discharge from the Willow Mill of the Hurlbut Paper Company. This discharge, like that from the Laurel Mill, does not have a serious impact on the river's water quality. There was no sampling station within this segment due to its inaccessibility. It is believed that conditions within this segment are similar to those in Segment 15. This, therefore, suggests that the Housatonic is not meeting its C classification.

Segment 17 - Confluence Kampoosa Brook to inlet Rising Pond - This segment marks the change of the Housatonic's classification from C to B. At the time of the 1974 surveys, this section of river was receiving the treated outfall from the Stockbridge STP. Samples taken in 1974 determined that the D.O. criterion for the B classification was being met and that the coliform criterion was being violated. This segment is currently meeting a C classification.

Segment 18 - Inlet to outlet Rising Pond - This segment includes Rising Pond from its inlet to its outlet. This pond is the third major impoundment along the Housatonic. The reduction of the river's velocity causes increased algal activity and significant settling of suspended matter. The massive accumulation of this settled matter, which was contained in poorly treated upstream discharges for many years, has eventually led to the resuspension of sludge cakes.

The daily fluctuation in D.O. due to algal activity, although reaching a high 24-hour variation of 11.4 mg/l, did not violate the D.O. criterion at night. There were still coliform violations which prevented this segment from meeting its Class B criteria and resulted in its present condition of C.

Segment 19 - Outlet Rising Pond to confluence with the Williams River - D.O. levels in this segment remained above the minimum allowable levels for a B classification. The coliform levels, however, remained high, causing violations of this criterion. This segment only meets a C classification because of these violations.

Segment 20 - Confluence with Williams River to the Great Barrington STP - This segment receives the relatively clean waters of the Williams River and an outfall of treated sewage from the Village of Great Barrington. The river continued to assimilate the instream waste load in this segment, and D.O. concentrations reflected this by a slight decrease. These drops, however, were not significant enough to violate criteria. The present condition of this segment is considered to be C.

Segment 21 - Great Barrington STP to the confluence with the Green River - In this segment, the Housatonic enters that portion of the valley often referred to as "the meanders." The slope of the channel changes significantly, from 15 feet per mile on the average for the first 20 segments, to 2 feet per mile for this segment and the two segments immediately downstream. This change in slope has brought about a change in velocity. This, in turn, has stimulated algal growth. Although algal activity did increase, minimum D.O. concentrations at night remained above the minima required to meet Class B

criteria. Coliform counts continued to violate criteria and increased from their already high values in the preceeding segment. This increase was due to individual outfalls of untreated sewage which were present in 1974. This segment's present condition is considered to be C.

Segment 22 - Confluence with Green River to the confluence with Hubbard Brook- There were no point sources of pollution in this segment in 1974. The river, after receiving the relatively clean water of the Green River, meanders south out of Great Barrington and into Sheffield. There were a number of individual D.O. violations recorded at the monitoring station near the end of this segment. Coliform concentrations remained in excess of the maximum allowable concentrations for this segment's B classification. Therefore, this segment's present condition is C.

Segment 23 - Confluence Hubbard Brook to the Mass.-Conn. state line - This last segment in Massachusetts is contained within the town limits of Sheffield. The only pollution entering the Housatonic is believed to be seepage from individual disposal systems in the town's center. This pollution does not have any significant impact on the Housatonic's water quality. Near the end of the segment the water quality of the river is very close to meeting Class B criteria.

Segments 1T and 2T - West Branch and Southwest branches - The West and Southwest branches converge in Pittsfield and travel approximately 0.8 miles to the confluence with the East Branch. A sampling station was included along this short stretch of river during the 1974 surveys to provide data on the two western branches. At this point, both branches have a C classification. The data collected at the sampling station were all within limits established for this classification. However, these data also indicated that some parameters were higher than background levels recorded on clean streams in this basin. At the present time, the possible sources of this suspected pollution are unknown.

Segment 3T - Goose Pond Stream - Prior to its confluence with the Housatonic, Goose Pond Stream receives the discharge from the Westfield River Paper Company. The treated effluent from this mill was not reflected in the stream's water quality a short distance above the confluence. This station showed clean water conditions with only individual incidences of high coliform counts. According to the best available data, this stream was meeting its B classification at the point of sampling.

Segment 4T - Williams River - The Williams River was sampled approximately one mile above its confluence with the Housatonic. The conditions at this station were comparable to any clean water station in the basin. There are, however, a number of known discharges of raw sewage in the upstream reaches near West Stockbridge. These additions to the instream pollutional load had been assimilated upstream of the sampling station and were therefore not apparent in the data collected. According to the best available data, this stream was meeting its B classification at the sampling station.

Segment 5T - Green River - The Green River was sampled a short distance above its confluence with the main stem Housatonic River. The data collected reflected clean water conditions. According to these data, the Green River was meeting its B classification.

Segment 6T - Hubbard Brook - Hubbard Brook is the one tributary sampled during the 1974 surveys that was not meeting its assigned B classification. Its present condition is considered to be C. The major violation was the coliform criterion. High coliform counts were attributed to the discharge of raw sewage from individual homes in and around the Town of Sheffield.

TABLE 11

HOUSATONIC RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	East Branch, Housatonic River River	Headwaters to Old Windsor Road, Dalton	Above 63.1	5.9	C	B
2	East Branch, Housatonic River	From Old Windsor Road, Dalton, to Crane Paper Co.,WTP outfall, Pittsfield	63.1-60.9	2.2	B	B
3	East Branch, Housatonic River	From Crane Paper WTP outfall to confluence with Unkamet Brook, Pittsfield	60.9-59.3	1.6	U	C
4	East Branch, Housatonic River	From confluence with Unkamet Brook to Newell St.,Pittsfield	59.3-57.1	2.2	U	C
5	East Branch, Housatonic River	From Newell St. to the confluence with the West and Southwest Branches, Pittsfield	57.1-55.4	1.7	U	C
6	Housatonic River	From confluence with West and Southwest Branches to the Pittsfield STP	55.4-50.9	4.5	U	C
7	Housatonic River	From the Pittsfield STP to the North Lenox STP, Lenox	50.9-49.1	1.8	U	C
8	Housatonic River	From the North Lenox STP to the inlet of Woods Pond	49.1-46.3	2.8	U	C
9	Housatonic River	From the inlet of Woods Pond to the Lenox Center STP and outlet of Woods Pond	46.3-45.0	1.3	U	C
10	Housatonic River	From the Lenox Center STP and outlet of Woods Pond to the Lenoxdale STP, Lenox	45.0-43.6	1.4	U	C

TABLE 11 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
11	Housatonic River	From Lenoxdale STP to the P.J. Schweitzer Paper Co. STP, Lee	43.6-42.0	1.6	U	C
12	Housatonic River	From P.J. Schweitzer Paper Co. STP to confluence with Goose Pond Stream	42.0-40.0	2.0	U	C
13	Housatonic River	From confluence of Goose Pond Stream to the Lee STP	40.0-39.5	0.5	C	C
14	Housatonic River	From the Lee STP to the Laurel Mill, Hurlbut Paper Company	39.5-36.3	3.2	C	C
15	Housatonic River	From Laurel Mill to Willow Mill, Hurlbut Paper Company	36.3-35.3	1.0	U	C
16	Housatonic River	From Willow Mill, Hurlbut Paper Co., to confluence with Kampoosa Brook, Stockbridge	35.3-34.3	1.0	U	C
17	Housatonic River	From confluence, Kampoosa Brook, to inlet, Rising Pond, Great Barrington	34.3-24.7	9.6	C	B
18	Housatonic River	From inlet to outlet, Rising Pond	24.7-24.4	0.3	C	B
19	Housatonic River	From outlet, Rising Pond, to confluence with Williams River, Great Barrington	24.4-23.3	1.1	C	B
20	Housatonic River	From confluence, Williams River, to the Great Barrington STP	23.3-19.2	4.1	C	B
21	Housatonic River	From Great Barrington STP to confluence with Green River, Great Barrington	19.2-15.9	3.3	C	B
22	Housatonic River	From confluence, Green River, to confluence with Hubbard Brook, Sheffield	15.9-9.0	6.9	C	B

TABLE 11 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
23	Housatonic River	From the confluence, Hubbard Brook, to the Mass.-Conn. state line	9.0-9.0	9.0	C	B
1T	West Branch, Housatonic River	From its headwaters to confluence with the East Branch, Pittsfield	Above 55.4, 0.0	4.0	B	B
2T	Southwest Branch, Housatonic River	From its headwaters to confluence with the West Branch, Pittsfield	Above 55.4, 0.8,0.0	0.8	C	C
3T	Goose Pond Stream	From the Westfield River Paper Co. outfall to confluence with Housatonic River, Lee	40.0-0.7-	0.7	B	B
4T	Williams River	From its headwaters to confluence with the Housatonic River, Great Barrington	Above 23.3, 0.0	10.1	B	B
5T	Green River	From its headwaters to confluence with the Housatonic River,Great Barrington	Above 15.9, 0.0	9.4	B	B
6T	Hubbard Brook	From its headwaters to confluence with the Housatonic River, Sheffield	Above 9.0, 0.0	2.3	C	B

Total Miles of Class B - 26.4
Total Miles of Class C - 47.0
Total Miles of Unsatisfactory Condition - 22.9

IPSWICH AND PARKER RIVER BASIN

Present Conditions

Segment 1 - Ipswich River- From its headwaters in the Town of Wilmington to the rise of the tide at the Sylvania Dam, Ipswich - This segment had the low dissolved oxygen levels associated with waters flowing through extensive wetland areas at a sluggish pace. This condition is a natural condition and hence, not a violation of the water quality standards. Moderate coliform bacteria levels were found in this segment which probably were from urban runoff, septic leachate, and natural soil bacteria populations. The segment is classified as B.

Segment 2 - Ipswich River - From the rise of the tide at the Sylvania Dam, Ipswich to Plum Island Sound - This segment is classified as SA. Previous to the recent upgrading of the Ipswich Sewage Treatment Plant, this segment's water quality was only SC due to high coliform bacteria levels. In addition to the sewage treatment plant effluent, illegal discharges to the estuary and probable septic tank failures contributed to the high coliform bacteria levels. Most of the segment was closed to shellfishing. The present condition should be much improved and will be surveyed in the summer of 1977.

Segment 3 - Parker River - From its headwaters to the rise of the tide in Newbury - The segment is classified as B and water quality surveys indicated that this classification was met throughout the segment.

Segment 4 - Mill River- From its headwaters to the confluence with the Parker River - This segment is classified as B in its freshwater section and SA in its saltwater section. Water quality surveys indicated that these classifications were met throughout the segment.

Segment 5 - Parker River - From the rise of the tide in Newbury to its discharge into Plum Island Sound - This segment is classified as SA and water quality surveys indicated that this classification was met throughout the segment.

TABLE 12

IPSWICH AND PARKER RIVER BASINS

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER		DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFI-CATION
1	Ipswich River	From its headwaters in Burlington to the rise of the tide in Ipswich	41.1-4.5	36.6	C&B	B
2	Ipswich River	From the rise of the tide in Ipswich to its mouth in Ipswich Bay	4.5-1.1	3.4	SB&SC	SA
3	Parker River	From its source in Boxford to the rise of the tide in Newbury	21.3-9.0	12.3	B	B
4	Parker River	From the rise of the tide in Newbury to its mouth in Plum Island Sound	9.0-0.0	9.0	SB	SA
5	Mill River	From its source in Georgetown to its confluence with the Parker River	9.6-0.0	9.6	B,SB	B,SA

Total Miles of Class SA - 14.5
Total Miles of Class B - 16.8
Total Miles of Class SB - 2.3
Total Miles of Class C - 32.8

Present Conditions

Segment 1 - Mass.-N.H. Line to Tyngsborough Bridge - Problems in this segment are caused by discharges in New Hampshire and by the Nashua River which flows into the Merrimack at Nashua, New Hampshire. High coliform bacteria concentrations and relatively high nutrient concentrations are present, but the river's assimilative capacity tempers the effect that the total oxygen demand of the waste has on the dissolved oxygen of the stream. Nutrient levels contribute to a slight algal condition. The floating solids present indicate the discharge of raw and/or inadequately treated sewage upstream.

Segment 2 - Tyngsborough Bridge to Pawtucket Dam - Discharges in Chelmsford and Lowell together with the waste load from upstream contribute to algal blooms in this segment. The dissolved oxygen is generally lower in this segment than in Segment 1, but the problem is only a slight one as the oxygen demand of the waste load is being exerted. Bacteria concentrations are much lower but still exceed water quality standards. The existence of algal problems is verified by the diurnal fluctuation of the dissolved oxygen and the high concentrations of green and blue-green algae present throughout this segment.

Segment 3 - Pawtucket Dam to Fish Brook, Andover - Untreated municipal and industrial waste water is discharged into the Merrimack at Lowell. Moderately low dissolved oxygen concentrations are present throughout the segment. Generally the upper half of the segment is of lower quality than the lower half. Coliform bacteria concentrations are quite high just below Lowell, but they decrease to a much lower level near Fish Brook. Floating solids are a slight problem below Lowell. Serious algal conditions exist and contribute to mid-depth dissolved oxygen problems. The improvement in water quality from Lowell to Fish Brook and the fact that water quality standards are not grossly violated indicates the huge assimilative capacity of the Merrimack.

Segment 4 - Fish Brook to the Dam in Lawrence - Algal problems caused by the nutrient and carbonaceous load from upstream discharges are critical. The dam serves to concentrate the algae which multiplies the problems. Dissolved oxygen levels are critically low at mid-depth levels, while the surface concentrations show a wide diurnal fluctuation under serious bloom conditions. Turbidity is high even with low algal concentrations. Coliform bacteria concentrations do not conform to water quality standards but are only a slight problem in this segment.

Segment 5 - From the Dam in Lawrence to Creek Brook, Haverhill - Untreated municipal and industrial waste waters from the communities of the Greater Lawrence Sanitary District are discharged into the Merrimack in this segment, and under low flow conditions the assimilative capacity to handle this load does not exist. Floating solids and scum cover the river and the water is very turbid. Coliform bacteria concentrations approach 1,000,000 per 100 ml and are high even under high flow conditions. Dissolved oxygen concentrations are critically low as the stream is unable to satisfy the oxygen demand of the Lawrence waste load. A sizable diurnal fluctuation in the dissolved oxygen indicates the algal problems that are caused by the high nutrient load in this segment.

Segment 6 - From Creek Brook to the Rocks Village Bridge - Untreated wastewater from Haverhill compounds the water quality conditions caused by the upstream discharges. Floating solids blanket the river, and turbidity is high. Bacteria concentrations are similar to those in Segment 5 and are very high. Dissolved oxygen concentrations are very low. Conditions at the lower portion of the reach are somewhat improved due to the greater volume of water brought in by the tide. Bacteria concentrations drop and the solids problem is not nearly as visible as it is upstream. The dissolved oxygen level is higher but still remains very low. Algae concentrations are higher in the lower end of the segment. However, even the much greater volume of water present at the lower end of the segment is not able to fully temper the effects of the upstream discharges.

Segment 7 - From the Rocks Village Bridge to the Atlantic Ocean - Bacteria concentrations steadily decrease even with the addition of several small discharges in this segment. This is due mainly to the increasing volume of water present as the segment reaches the Atlantic Ocean. Moderate dissolved oxygen problems remain right into the Newburyport Harbor and then disappear dramatically at the mouth of the river. The major influence in this segment is its tidal nature. The large volume of water present at all times and the flushing action of the tide "treat" the remaining pollutants.

Segment 8 - The Basin - Slight bacteria and dissolved oxygen problems caused by upstream discharges keep this segment from achieving its assigned water use classification (SA).

Segment 9 - Stony Brook - A moderate oxygen problem is caused by the Chelmsford discharges. Nutrient concentrations contribute to a slight algal problem. A slight bacteria problem becomes very serious just before the confluence with the Merrimack River. Industrial discharges in Chelmsford cause serious color and turbidity problems in the lower portion of this segment.

Segment 10 - Beaver Brook - Upstream discharges from New Hampshire together with discharges in Dracut and Lowell create very high bacteria concentrations and a slight solids problem. Dissolved oxygen concentrations remain relatively high due to the steep gradient of the brook and the resultant reaeration.

Segment 11 - Spickett River from Mass.-N.H. Line to the Route 28 Bridge, Lawrence - Discharges from Salem, New Hampshire, are expected to cause moderate oxygen, bacteria, and nutrient problems. The Environmental Protection Agency is preparing a report on the Spickett River which will detail the water quality in this segment.

Segment 12 - From the Route 28 Bridge to its mouth at the Merrimack River - Severe water quality problems exist in this segment due to the discharge of large quantities of raw sewage and industrial waste water. One such discharge in the lower portion of the segment more than doubles the flow in the stream. Color and solids are very high in the segment. Bacteria concentrations are well in excess of 1,000,000 per 100 ml. Dissolved oxygen levels are low and the diurnal fluctuation in the levels indicates the presence of algae.

Segment 13 - Little River from Mass.-N.H. Line to the Winter Street Bridge, Haverhill - The Merrimack River Basin Water Quality Management Plan by the State of New Hampshire indicates that discharges in Plaistow, N.H., degrade this segment to Class C (assigned water quality standard is B).

Segment 14 - Little River from the Winter Street Bridge to its mouth at the Merrimack River - At times the dissolved oxygen concentration is 0.0 in this segment due to its low flow and the many discharges that go into it. Color, solids, and turbidity are very high. Coliform bacteria concentrations are very high as this segment is little more than a sewer for the wastewater in the immediate area.

Segment 15 - Cobbler Brook - This segment receives sewage and industrial waste from the Town of Merrimac which degrades it to a Class C stream.

Segment 16 - Powwow River from Mass.-N.H. Line to 1.25 miles from its mouth - This segment is degraded in Amesbury Center by runoff and municipal and industrial discharges to a Class C stream.

Segment 17 - Tidal portion of the Powwow River - Discharges in Amesbury which cause slight bacteria and oxygen problems prevent this segment from meeting its assigned water use classification (SB).

Segment 18 - Black Rock Creek - Chlorinated sewage from Salisbury causes severe problems in this segment. High solids and color are present and the dissolved oxygen is very low. Coliform bacteria concentrations are very high. The flow in this segment is too low to handle the waste load from Salisbury.

Segment 19 - Plum Island River - There are insufficient data on this segment to make an accurate water quality assessment, but it is expected that the unsewered areas of Newbury and Plum Island cause slight problems in this segment which prevent it from meeting its SA classification.

SHAWSHEEN RIVER:

Segment 6 - Maguire Road to confluence with Spring Brook - Water quality of this segment was generally good when sampled in 1974. Dissolved oxygen concentrations were well above assigned Class B standards. The bottom consisted of a sandy-rocky type substrate with moderate aquatic vegetation present.

Segment 5 - Confluence with Spring Brook to Boston Road, Route 3A - There appeared to be no adverse effect to the water quality conditions associated with the Bedford Veteran's Administration Hospital wastewater treatment plant discharge into Spring Brook. D.O. concentrations were relatively high during both surveys. A rocky type substrate with many riffle areas aided in adding dissolved oxygen. However, just below Route 62, the Shawsheen River flows into its first swampy reach. The substrate in this stretch was covered with a dense growth of submerged aquatic vegetation. Diurnal dissolved oxygen fluctuations occurred. This stretch characterizes an extreme case of natural degradation of water quality caused by the decomposition of organic matter found in the marsh.

Segment 4 - Boston Road, Route 3A, to Shawsheen Road to the USGS Gage - This reach was also very swampy and slow moving. Average D.O. concentrations improved somewhat but were still below standards.

Segment 3 - Shawsheen Road at the USGS Gage to Mill Street - The average dissolved oxygen concentration was found to be below standards. This was attributed to the marshy reach just above. Fluctuations in dissolved oxygen values indicated photosynthetic activity.

Segment 2 - Mill Street to Horn Bridge - A severe sag in dissolved oxygen values occurred within this Segment. This was attributed to the decomposition at organic matter coupled with the Shawsheen's slow travel time through this swampy stretch.

Segment 1 - Horn Bridge to confluence with Merrimack River - Average dissolved oxygen concentrations of this reach were relatively good. However, there were fluctuations of D.O. levels. The substrate was generally composed of rocks and gravel with a few riffle areas helping to add oxygen to the river.

TABLE 13

MERRIMACK RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Merrimack River	N.H.-Mass. state line to Tyngsborough bridge, Tyngsborough	49.82-47.35	2.47	U	C
2	Merrimack River	Tyngsborough Bridge to Pawtucket Dam, Lowell	47.35-40.60	6.75	U	B
3	Merrimack River	Pawtucket Dam to Fish Brook, Andover	40.60-33.03	7.57	U	C
4	Merrimack River	Fish Brook to dam in Lawrence	33.03-29.0	4.03	U	B
5	Merrimack River	Dam in Lawrence to Creek Brook, Haverhill	29.0-21.85	7.15	U	C
6	Merrimack River	Creek Brook to Rocks Village Bridge, Haverhill-West Newbury	21.85-11.80	10.05	U	SC
7	Merrimack River	Rocks Village Bridge to Atlantic Ocean	11.80-0.0	11.80	U	SB
8	Merrimack River	The Basin in the Merrimack River Estuary, Newbury-Newburyport	---	---	SC	SA
9	Stony Brook	Outlet of Forge Pond, Westford, to confluence with Merrimack River, Chelmsford	10.3-0.0	10.30	C	B
10	Beaver Brook	N.H.-Mass. line to confluence	4.2-0.0	4.20	C	B
11	Spickett River	N.H.-Mass. line to Route 28 bridge, Lawrence	6.4-2.8	3.60	C	B
12	Spickett River	Route 28 bridge to confluence	2.8-0.0	2.80	U	C
13	Little River	N.H.-Mass. line to Winter Street bridge, Haverhill	4.3-0.48	3.82	C	B

TABLE 13 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
14	Little River	Winter Street bridge to confluence	0.48-0.0	0.48	U	B
15	Cobbler Brook	Entire length	3.67-0.0	3.67	C	B
16	Powwow River	N.H.-Mass. line to the point 1.25 miles from confluence with Merrimack River	6.4-1.25	5.15	C	B
17	Powwow River	Point 1.25 miles upstream to confluence	1.25-0.0	1.25	SC	SB
18	Black Rock Creek	Entire length	1.70-0.0	1.70	U	SB
19	Plum Island River	Plum Island Sound & Parker River to confluence	3.6-0.0	3.60	SB	SA
6	Shawsheen River	Maguire Rd. to confluence, Spring Brook	25.0-23.3	1.70	C	B
5	Shawsheen River	Confluence with Spring Brook to Boston Road, Route 3A	23.3-19.4	3.90	C	B
4	Shawsheen River	Boston Rd., Rte. 3A, to Shawsheen Rd. at USGS gage	19.4-16.0	3.40	C	B
3	Shawsheen River	Shawsheen Rd. at USGS gage to Mill St.	16.0-12.2	3.80	C	B
2	Shawsheen River	Mill St. to Horn Bridge	12.2-5.9	6.30	C	B
1	Shawsheen River	Horn Bridge to confluence with Merrimack River	5.9-0.0	5.90	C	B

Total Miles of Class SB - 3.60
Total Miles of Class C - 55.74
Total Miles of Class SC - 1.25
Total Miles of Unsatisfactory Conditions - 54.80

Present Condition

OTTER RIVER:

Segment 2 - Above Gardner STP - This segment has severe D.O. problems and moderate suspended solids problems. Although this segment is proposed to be Class B, the present D.O. levels barely reach Class C criteria. The major problems associated with this segment are lack of aeration and the decay of vegetative matter in the river's swampy headwaters. During periods of heavy precipitation, there are over-flows and bypasses in the Gardner sewer system which also degrade the quality of this segment.

Segment 3 - Gardner STP to Seaman Paper Company - Severe nutrient and coliform problems along with a moderate solids and D.O. problem combine to degrade the water quality in this segment below Class C levels. The problems in this segment are caused by the discharge from the Gardner STP.

Segment 4 - Seaman Paper Company to Baldwinville Paper Products - The problems associated with this segment are primarily due to carryover effects from Segment 3. The same parameters are violated, but to a lesser degree.

Segment 5 - Baldwinville Paper Products to Millers River - All seven categories are violated in this segment. Dissolved oxygen, solids, and pH are severe problems; temperature and floating solids are moderate problems; while coliform and nutrients are minor problems. Consequently, the water quality in this segment is far below the criteria for Class C1. The discharge from Baldwinville Paper Products is the reason for these conditions.

MILLERS RIVER:

Segment 0 - Above the Winchendon STP - The upper reaches of the Millers River are classified as A and B waters. For the most part, criteria for these classifications are being met. The exception is below Winchendon Center where occasional high coliform counts are caused by runoff.

Segment 1 - Winchendon STP to Otter River - This segment is now meeting its assigned Class B criteria.

Segment 6 - Otter River to South Royalston USGS gage - This segment has severe D.O. and solids problems, moderate problems with floating solids, and minor coliform bacteria problems. These problems prevent the river from meeting Class C criteria and are a carryover of the conditions present in the Otter River.

Segment 7 - South Royalston gage to Tully River - The problems in the upstream portion of this segment are similar to those of Segment 6 and due to the same reasons. This segment has a large assimilative capacity and therefore the downstream portion of this segment is near the B classification assigned to it.

Segment 8 - Tully River to Orange Center - This segment has moderate coliform bacteria, D.O., and nutrient problems as well as minor solids and floating solids problems. These problems are caused by the discharge from the Athol WWTP and prevent this segment from meeting its assigned B classification.

Segment 9 - Orange Center to Erving Paper Company - Raw wastewater discharges from Orange have been eliminated, but some problems are caused by carry-over effects from Segment 8. This segment essentially meets its assigned B classification.

Segment 10 - Erving Paper Company to Millers Falls Paper Company - Severe D.O. and solids problems along with minor pH and coliform bacteria problems prevent this segment from meeting Class B criteria. These problems originate at the raw discharge from Erving Paper Company.

Segment 11 - Millers Falls Paper Company to Millers Falls Dam - The problems associated with this segment are similar to those of Segment 10, and in large part they are due to carry-over effects. This segment also falls below its assigned B classification.

Segment 12 - Millers Falls Dam to Connecticut River - Solids and color problems are still severe in this segment. However, dissolved oxygen problems are less significant. Again, the water quality is below Class B criteria.

TABLE 14

MILLERS RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
0	Millers River	Above Winchendon STP	Above 35.7	6.5	B	B
1	Millers River	Winchendon STP to confluence, Otter River	35.7-30.4	5.3	B	B
2	Otter River	Above Gardner STP	Above 9.7	2.5	C	B
3	Otter River	Gardner STP to Seaman Paper	9.7-5.3	4.4	U	C
4	Otter River	Seaman Paper to Baldwinville Products	5.3-3.9	1.4	U	C
5	Otter River	Baldwinville Products to confluence, Millers River	3.9-0.0	3.9	U	C1
6	Millers River	Otter River to South Royalston USGS Gage	30.4-25.6	4.8	U	B1
7	Millers River	South Royalston USGS gage to Tully River	25.6-19.1	6.5	U	B
8	Millers River	Tully River to Orange	19.1-13.6	5.5	C	B
9	Millers River	Orange to Erving Paper	13.6-8.1	5.5	B	B
10	Millers River	Erving Paper to Millers Falls Paper	8.1-2.3	5.8	U	B
11	Millers River	Millers Falls Paper to Falls Dam	2.3-1.8	0.5	U	B
12	Millers River	Millers Falls Dam to confluence with Connecticut River	1.8-0.0	1.8	U	B
13	Beaver Brook	From Fernald School to Millers River	3.1-0.0	3.1	C	B

Total Miles of Class B - 17.3
Total Miles of Class C - 11.1
Total Miles of Unsatisfactory conditions - 29.1

NASHUA RIVER BASIN

Present Conditions

Segment 1 - Confluence of North and South Branches to the Ice House Dam - The non-point sources in this segment are of minimal importance since much of the segment is in the undeveloped portion of the Fort Devens Military Reservation (including the Oxbow National Wildlife Refuge). Some agricultural runoff can be expected in Lancaster and Harvard. The Route 2 - Jackson Road interchange is a potential source of chlorides contamination in the winter. The dump at the Shirley Industrial School is in an unsuitable location and is poorly operated. Leachate and runoff from this operation will enter the river. Urban stormwater runoff can be expected in the developed portions of Shirley and Fort Devens at the lower end of the segment.

Segment 2 - Ice House Dam to Pepperell Dam - This segment is in a largely undeveloped area. Some urban runoff can be expected from the Fort Devens complex at the beginning of the segment. There is the possibility of agricultural runoff at several locations in Ayer and Groton with the Ayer State Game Farm being important to this aspect of non-point source pollution. Several heavily travelled roads cross the river in this segment, and the problems associated with highway runoff can be expected from them. The only significant non-point source in this segment is the Groton Dump, which is located on the banks of Pepperell Pond. During periods of high flow, the river comes right up to the foot of this open dump.

Segment 3 - Pepperell Dam to the Mass.-N.H. state line - Inadequate materials storage at Pepperell Paper Company causes aesthetic and runoff problems in this segment. Minor urban runoff can be expected from East Pepperell.

Segment 4 - Fitchburg Westerly WWTP to Daniel Street - Urban stormwater runoff is an important factor in this segment. Industrial development is heavy on both banks, and runoff from the residential and commercial areas also enters the river. A major highway runs along one side of the river and runoff from it will cause problems.

Segment 5 - Daniel Street to the Fitchburg Easterly WWTP - This segment of the river flows through the center of Fitchburg and is subject to very heavy stormwater runoff. There are thirteen bridges over the river in this segment, and most of them are heavily travelled. There is an old landfill site next to the river, and the Massachusetts Department of Public Health feels that it is still contributing pollutants to the river.

Segment 6 - Fitchburg Easterly WWTP to the Leominster WWTP - Stormwater runoff is a problem in this segment, but the river flows around the center of Leominster so the problem is not as criticial as it is in Segment 5. Runoff from the huge Searstown parking lot and the Mohawk Industrial Park are the major non-point sources in this segment. The Route 2-13 interchange contributes highway runoff problems with chlorides contamination being important in the winter.

Segment 7 - Leominster WWTP to the confluence with the South Nashua - Most of this segment is in an undeveloped area. The Leominster Landfill borders on the river, and leachate from it is known to pollute the river. Agricultural runoff is of some importance with the major source being the Pinecrest Duck Farm in Sterling. The summer operation of this farm contaminated Wekepeke Brook which flows into the North Nashua River. Route 117 and the North Main Street Bridge both contribute the pollutants associated with highway runoff.

Segment 8 - Lancaster Millpond to the MDC-Clinton WWTP - Stormwater runoff from Clinton is the only important non-point source in this segment. Run-off from an automotive junkyard may cause slight problems.

Segment 9 - MDC-Clinton WWTP to the confluence with the North Nashua - There is some urban runoff in this segment but it is thought to be minor. An automotive junkyard may cause slight problems due to runoff.

Segment 10 - Flagg Brook to the confluence with the Whitman River - There is a small urban runoff problem in this segment which is primarily associated with the roof and parking lot drains at the James River Paper Company. Sawmill Pond is contaminated by a pig farm and by runoff from Route 2.

Segment 11 - Whitman River to the confluence with Flagg Brook - Non-point source pollution problems are minor in this segment. A swamp at the headwaters of the Whitman River is polluted by the inadequate disposal of septage, particularly in the winter. There is a slight urban runoff problem in South Ashburnham. Snows Millpond is polluted by runoff from Route 2A.

Segment 12 - Phillips Brook - Urban runoff is a problem in Ashburnham Center and at the lower end of the segment in Fitchburg. A slight agricultural runoff problem exists in Ashburnham.

Segment 13 - Baker Brook - Urban stormwater runoff is the major non-point source in this segment. Leachate from the old Fitchburg Landfill may also pollute this segment.

Segment 14 - Monoosnoc Brook - Urban runoff is a problem in this segment as it flows through the center of Leominster. The upper portion of the segment receives highway runoff from Route 2.

Segment 15 - Fall Brook - This segment is subject to small amounts of urban runoff in its upper portion. The lower portion is in close proximity to the Doyle Industrial Complex which results in runoff from roads, parking lots, and roof drains within the complex.

Segment 16 - Counterpane Brook - Most of this segment passes under the Town of Clinton and is subject to numerous point discharges. The lower portion of the segment is subject to urban runoff, but this is a minor problem.

Segment 17 - Still River - Agricultural runoff is the only significant non-point source in this segment, and it is a minor one. The segment's proximity to Route 110 indicates the possibility of highway runoff problems.

Segment 18 - Catacoonamug Brook - Urban runoff is important in the lower portion of this segment. Septic tank leachate is a probable source in Lake Shirley.

Segment 19 - Nonacoicus Brook - A slight urban stormwater runoff problem exists.

Segment 20 - Squannocook River to West Groton - There are slight urban and agricultural runoff problems in Townsend. Most of the land along this segment is conservation land and, thus, there are no runoff problems of any significance.

Segment 21 - Squannacook River from West Groton to the Nashua River - There is a slight urban runoff problem in West Groton. The only significant non-point sources in this segment are the two paper company complexes where run-off from roofs and grounds may be expected to cause very minor problems.

Segment 22 - James Brook - There is some urban runoff in Groton Center. Agricultural runoff is the only significant non-point source in this segment. There is probable pesticides pollution from adjacent apple orchards and run-off from the Ayer State Game Farm can be expected to enter the brook.

TABLE 15

NASHUA RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Nashua River	From confluence of the North and South Branches, Lancaster, to the Ice House Dam	36.45-26.10	10.35	U	B1
2	Nashua River	From the Ice House Dam to Pepperell Dam	26.10-14.15	11.95	U	B1
3	Nashua River	From Pepperell Dam to Mass.-N.H. state line	14.15-10.52	3.63	U	B1
4	North Nashua	From the Fitchburg Westerly STP to Daniel Street Bridge, Fitchburg	56.14-54.04	2.10	U	C
5	North Nashua	From Daniel Street Bridge to the Fitchburg Easterly STP	54.04-48.53	5.51	U	C
6	North Nashua	From Fitchburg Easterly STP to the Leominster STP	48.53-46.42	2.11	U	C
7	North Nashua	From Leominster STP to the confluence with the South Nashua in Lancaster	46.42-36.45	9.97	U	C
8	South Nashua	From the outlet of Lancaster Millpond, Clinton, to the Clinton STP	4.60-1.57	3.03	U	B
9	South Nashua	From the Clinton STP to the confluence with the North Nashua in Lancaster	1.57-0.00	1.57	U	B1
10	Flagg Brook	From the outlet of Sawmill Pond to the confluence with the Whitman River	1.20-0.0	1.20	U	B
11	Whitman River	From the outlet of Lake Wampanoag to the confluence with Flagg Brook	6.71-0.0	6.71	C	B
12	Phillips Brook	Entire length	8.0-0.0	8.0	C	B

TABLE 15 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
13	Baker Brook	Entire Length	2.33-0.0	2.33	B	B
14	Monoosnoc Brook	Entire Length	5.67-0.0	5.67	U	B
15	Fall Brook	Entire Length	3.03-0.0	3.03	C	B
16	Counterpane Rook	Entire Length	1.14-0.0	1.14	C	B
17	Still River	Entire Length	3.1-0.0	3.10	B	B
18	Catcoonamug Brook	Entire Length	2.04-0.0	2.04	C	B
19	Nonacoicus Brook	Entire Length	1.52-0.0	1.52	C	B
20	Squannacook River	From its source in Townsend to Hollingsworth and Vose, West Groton	14.33-3.57	10.76	C	B
21	Squannacook River	From Hollingsworth and Vose to its confluence with the Nashua River, Ayer	3.57-0.0	3.57	C	B1
22	James Brook	Entire Length	4.42-0.0	4.42	C	B

Total Miles of Class B - 5.43
Total Miles of Class C - 41.19
Total Miles of Unsatisfactory Conditions - 57.09

NOTE: The Fitchburg Easterly and Westerly plants have produced definite water quality improvements in the North Branch and Mainstem Nashua River. These areas will be resurveyed during the summer of 1977, after which time the Division will fully evaluate the water quality improvement of these segments.

NORTH RIVER BASIN

Present Condition

Segment 1 - Weymouth Naval Air Station to North Abington Discharge - This segment has minor coliform and dissolved oxygen problems and moderate nutrient problems preventing the segment from meeting its assigned B classification. These problems are associated with non-point sources and the discharge from the Weymouth Naval Air Station Wastewater Treatment Facility.

Segment 2 - North Abington Discharge to Inlet Studley Pond - Minor coliform, dissolved oxygen, and nutrient problems along with moderate solids problems prevent this segment from meeting its assigned B classification. These problems are associated with the seepage from the North Abington STP sand filter beds.

Segment 3 - Inlet to Outlet Studley Pond - This segment has minor coliform and nutrient problems. These are essentially carry-over problems from previous segments.

Segment 4 - Outlet Studley Pond to Rockland STP - There are moderate coliform, dissolved oxygen, and metals problems and minor nutrient problems. The dissolved oxygen and coliform problems are related to the marshy area through which the river is passing. The source of the metals is not known at this time.

Segment 5 - Rockland STP to Inlet Forge Pond - Severe coliform, dissolved oxygen, and nutrient problems along with moderate metals and solids problems prevent this segment from meeting its assigned B classification. These conditions are due to the discharge from the Rockland Wastewater Treatment Facility.

Segment 6 - Inlet to Outlet Forge Pond - This segment is also affected by the Rockland discharge. Moderate dissolved oxygen and nutrient problems and minor coliform and metals problems are present. It does not meet its B classification.

Segment 7 - Outlet Forge Pond to Outlet Factory Pond - This segment is also affected by the Rockland discharge. There is some improvement in this segment but it is still below Class B quality.

Segment 8 - Outlet Factory Pond to South Hanover Dam - There are moderate dissolved oxygen problems and minor coliform, nutrients, and metals problems. Most of these problems relate to the swampy conditions present in this segment.

Segment 9 - South Hanover Dam to Curtis Crossing Dam - Moderate dissolved oxygen problems along with minor nutrient and metals problems exist in this segment. This is due to swampy areas and some non-point sources. Like all the previous segments, this segment is below its assigned B classification.

Segment 10 - Curtis Crossing Dam to Washington Street- This segment essentially meets its assigned SB classification. Occasional high coliform counts are due to runoff from Hanover. This segment is tidally influenced, chiefly causing a backup of fresh water during high tide.

Segment 11 - Washington Street to Massachusetts Bay - This segment essentially meets its assigned SA classification. There are occasional high coliform counts in the main stem and several of the tributaries, due mainly to non-point sources. There is extensive pleasure boating in this area and the effects of this deserve further investigation.

Segment 12 - South River - Moderate coliform bacteria and minor nutrient problems are present in the South River. These problems are related to failing septic systems in the Humarock section of Scituate. The quality of the water is presently meeting the assigned SB criteria.

Segment 13 - Green Harbor - There are moderate coliform bacteria problems present in Green Harbor which prevent the harbor from meeting its assigned SA classification. The problems are caused by extensive motorboat traffic and occasional by-passing at the Marshfield Wastewater Treatment Plant.

Segment 14 - Duxbury Bay - This area is presently meeting its assigned SA classification. However, failing septic systems are becoming a problem and may create violations in the near future.

TABLE 16

NORTH RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	French Stream	Weymouth Naval Air Station to North Abington STP	20.6-19.4	1.2	C	B
2	French Stream	North Abington STP to inlet, Studley Pond	19.4-18.7	0.7	C	B
3	French Stream	Inlet to outlet, Studley Pond	18.7-18.4	0.3	C	B
4	French Stream	Outlet, Studley Pond to Rockland STP	18.4-16.9	1.5	C	B
5	French Stream	Rockland STP to inlet, Forge Pond	16.9-15.7	1.2	C1	B
6	Drinkwater River	Inlet to outlet, Forge Pond	15.7-15.3	0.4	C	B
7	Drinkwater River	Outlet, Forge Pond to outlet, Factory Pond	15.3-13.9	1.4	C	B
8	Indian Head River	Outlet, Factory Pond to South Hanover Dam	13.9-12.9	1.0	C	B
9	Indian Head River	South Hanover Dam to Curtis Crossing Dam	12.9-11.6	1.3	C	B
10	North River	Curtis Crossing Dam to ocean	11.6-0.0	11.6	SB	SB
11	South River	From headwaters to North River	10.6-0.0	10.6	SB	SA

Total Miles of Class C - 7.8
Total Miles of Class C1 - 1.2
Total Miles of Class SB - 22.2

SUASCO RIVER BASIN

Present Conditions

Segment SU01 - Above the outlet of Saxonville Pond - This segment had coliform bacteria problems in the heavily populated areas of Ashland and Framingham. Urban runoff, septic leachate and storm sewers were the probable sources of the bacteria in the stream. During the August 1973 survey, the dissolved oxygen levels were found to be below the designated Class B criteria. This section of the river is designated as anti-degradation.

Segment SU02 - Outlet of Saxonville Pond to Wash Brook - This segment had extreme dissolved oxygen problems during the periods when the adjoining meadowlands were draining into the main channel of the river, carrying organic matter which created an oxygen demand in the river. This phenomenon is believed to be a natural occurrence. Coliform bacteria levels were high in this segment. Pesticides were heavily dosed in this area. The segment did not meet its Class B criteria.

Segment SU03 - Wash Brook to Assabet River - A continuation of the dissolved oxygen problem from Segment SU02 was found in this section. Meadowlands on both banks of the river provided oxygen-demand material. Coliform bacteria levels were high, and there was a moderate nutrient problem. This segment did not meet the criteria for the designated B classification.

Segment HP01 - Hop Brook, Marlborough East STP to Sudbury River - This segment had nutrient problems, severe algal blooms, and moderate coliform bacteria levels. The brook is a series of millponds which receive a treatment plant effluent at the headwaters of the first pond. An advanced waste treatment system was put into operation in December 1973, and an intensive resurvey is being conducted to determine the up-to-date water quality. The benthic release of nutrients is expected to continue for a number of years, continuing to produce eutrophic conditions in the ponds. As the brook flows through a densely populated area in the Town of Sudbury, moderate coliform counts were found, probably from individual septic systems. The proposed classification for Hop Brook is B, but surveys showed that the water quality did not meet the B classification.

Segment CO01 - Sudbury River to Billerica STP - As in the Sudbury River, dissolved oxygen problems caused by the meadowlands were found in this section. The problem occurs only during certain periods of the year but can be expected to be repeated annually. Coliform bacteria levels remained moderately high in this segment and can be attributed to meadowland runoff and individual septic systems. Nutrient levels were sufficient to support eutrophic conditions. This segment did not meet the criteria required for its B classifications.

Segment CO02 - Billerica STP to Merrimack River - This segment had coliform bacteria problems due to raw sewage discharges in Lowell. Dissolved oxygen did not appear to be a problem in this section. Nutrient levels were moderately high.

Segment AS01 - Above the Westborough STP - Dissolved oxygen, coliform bacteria, and nutrients were all moderate problems in this section. The waters at the headwaters, flowing out of the recently constructed augmentation pond, did not meet Class B criteria, thus hampering the quality of the downstream waters.

Segment AS02 - Westborough STP to Shrewsbury STP - The combination of low stream flow and sewage treatment plant effluent gives this section a U rating. Low dissolved oxygen levels and high nutrient levels were found in this segment of the stream. Periodic coliform bacteria problems occurred. The small amount of flow in this segment severely limits the assimilative capacity of the stream.

Segment AS03 - Shrewsbury STP to dam, Route 20, Northborough - The addition of a secondary treatment plant effluent further degrades the water quality. Oxygen demand and nitrification cause severe dissolved oxygen problems. Nutrient problems were very high and remained so for many miles downstream. High coliform bacteria levels were present in this segment. The proposed Class C for this segment was violated, giving this segment a U rating.

Segment AS04 - Dam, Route 20, Northborough, to Marlborough West STP - The ample nutrients from the upstream sewage treatment plants cause eutrophic conditions in the impoundment in this section. Dissolved oxygen levels throughout this segment were well below the Class B criteria proposed for this segment. Coliform bacteria from adjacent farmlands caused a moderate problem.

Segment AS05 - Marlborough West STP to Hudson STP - This segment had dissolved oxygen problems due to the aquatic plant usage of the ample nutrients present in the stream, causing significant diurnal fluctuation of the dissolved oxygen level. A large impoundment in the upper section was found to be highly eutrophic. As the river flows through the Town of Hudson, coliform bacteria levels increased from sewer leaks and urban runoff. The section did not meet the Class B designation, and its quality was U.

Segment AS06 - Hudson STP to outlet of Boons Pond - The Gleasondale impoundment, located in the upstream section of this segment, was found to be very eutrophic. The water quality problems were attributed to the sewage treatment plant discharge located at the beginning of this segment. At the outlet of the impoundment, there were low dissolved oxygen levels, high levels of nutrients, and moderate levels of coliform bacteria. As the river flows out of the impoundment, it begins to assimilate the waste load and begins to recover. At the end of the segment, moderate levels of nutrients and low dissolved oxygen, due to diurnal fluctuation from aquatic vegetation, were the problems. The segment was of U quality rather than the proposed Class C.

Segment AS07 - Outlet of Boons Pond to Maynard STP - During the 1974 survey, this section of the Assabet River was found to have the fewest water problems in the river. Dissolved oxygen problems were present because of aquatic vegetation activity. Sufficient nutrients were available to facilitate this activity. A moderate problem from coliform bacteria levels was found in this section. The quality of this segment was Class C.

Segment AS08 - Maynard STP to Concord MCI - High nutrient levels facilitated nitrification in the stream which resulted in low dissolved oxygen levels. The B classification was severely violated and the quality was U.

Segment AS09 - Concord MCI to Sudbury River - This segment had dissolved oxygen, coliform bacteria, and nutrient problems. The Class B criteria for this section were violated.

TABLE 17

SUASCO RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Sudbury River	Above outlet, Saxonville Pond	Above 16.4	15.0	C	B
2	Sudbury River	Outlet, Saxonville Pond to Wash Brook	16.4-11.0	5.4	C1	B
3	Sudbury River	Wash Brook to confluence, Assabet River	11.0-0.0	11.0	C1	B
1	Hop Brook	Marlborough East STP to Sudbury River	9.7-0.0	9.7	U	B
1	Concord River	Sudbury River to Billerica STP	15.2-4.0	11.2	C1	B
2	Concord River	Billerica STP to Merrimack River	4.0-0.0	4.0	U	C
1	Assabet River	Above Westborough STP	Above 30.4	1.4	C	B
2	Assabet River	Westborough STP to Shrewsbury STP	30.4-29.6	0.8	U	B1
3	Assabet River	Shrewsbury STP to Rte. 20 dam, Northborough	29.6-26.5	3.1	U	B1
4	Assabet River	Rte. 20 dam to Marlborough West STP	26.5-24.0	2.5	U	B
5	Assabet River	Marlborough West STP to Hudson STP	24.0-15.9	8.1	U	B
6	Assabet River	Hudson STP to outlet of Boons Pond	15.9-12.4	3.5	U	B1
7	Assabet River	Outlet, Boons Pond, to Maynard STP	12.4-6.8	5.6	C1	B
8	Assabet River	Maynard STP to Concord MCI	6.8-2.6	4.2	U	B
9	Assabet River	Concord MCI to Sudbury River	2.6-0.0	2.6	U	B

Total Miles of Class C - 16.4
Total Miles of Class C1 - 33.2
Total Miles of Unsatisfactory Conditions - 38.5

TAUNTON RIVER BASIN

Present Conditions

Segment 1 - Taunton River from its source to Nemasket River confluence - Problems in this segment are caused by the Brockton STP discharge, Bridgewater STP discharge, and some non-point problems. Already low dissolved oxygen concentrations steadily decrease due to nitrogenous oxygen demand. Nutrient and coliform levels remain high.

Segments 2 and 3 - Taunton River, Nemasket River to Mill River confluence - Organic loads from the upstream discharges are assimilated and dissolved oxygen recovers to normal levels. However, large amounts of phosphorus and nitrate are present in the freshwater flow.

Segment 4 - Taunton River, Mill River to Berkley Bridge - Discharges affecting this segment are the Taunton STP, Geilich Tanning, Royce Aluminum, combined sewers in Taunton, and the Harodite Finishing discharge at the confluence of the Three Mile River. Because of these discharges, the D.O. remains low and the nutrients remain high. The heavy nutrient load also causes a significant algal growth. Coliform levels remain high. Slight temperature increase due to the Taunton Municipal Light Company.

Segment 5 - Taunton River, Berkley Bridge to mouth at Battleship Cove - Downstream of the Berkley Bridge, the estuary broadens and the tidal waters increase the volume of the estuary. Due to the large volume of water, D.O. increases but remains low during low tide. Nutrient and coliform levels decrease. There is also a slight temperature increase caused by the Montaup Electric discharge. Other problems include combined sewer overflows and the Quequechan River, which receives large quantities of industrial wastes and raw sewage.

Segment 6 - Trout Brook - Urban runoff and one plating company discharge contribute to problems in this segment. Major violations occur in dissolved oxygen and coliform.

Segment 7 - Salisbury Plain and Matfield Rivers - Some urban runoff problems are noted above the Drew Tanning and Brockton STP discharges. Below these discharges, the river is severely degraded with low D.O. and high nutrient, solids, color, and coliform concentrations.

Segment 8 - Satucket River and its tributaries - Problems in this segment include dissolved oxygen, coliform and a slight nutrient problem. These problems are caused by non-point sources.

Segment 9 - Town River and its tributaries - Discharges in this segment are the Bridgewater STP, Howard School to the Town River, and a process waste from a dairy discharging to South Brook. There are D.O. sags downstream of these discharges. The phosphorus and nitrogen inputs also promote algae and aquatic week growth. Coliform results also indicate bacterial contamination.

Segment 10 - Nemasket River - The upper portion of the Nemasket River is relatively clean, although the total coliform data indicate that some raw

sewage enters the river as it passes through Middleborough. The water quality of the lower Nemasket River is seriously degraded as a result of the discharge from the Town of Middleborough's secondary treatment plant. During the 1970 survey, the D.O. levels were consistently less than 3.0 mg/1. The nutrients in the effluent stimulate algae and aquatic plants in the lower Nemasket.

Segment 11 - Saw Mill Brook - All parameters are violated due to the discharge from the Bridgewater MCI.

Segment 12 - Mill River - Combined sewer overflows cause severe dissolved oxygen and bacterial contamination.

Segment 13a - Rumford River, outlet Norton Reservoir to confluence with Wading River - In the section of the Rumford River from the outlet of Norton Reservoir to its confluence with the Wading River, the effects of sludge demand from settled algae and from minimal stream reaeration cause a depletion in the D.O. levels.

Segment 13 - Rumford River, from source to outlet Norton Reservoir - Violations in dissolved oxygen and coliform bacteria levels upstream of Norton Reservoir due to improperly treated sewage and non-point sources occur. Nutrient loads from several sources are contributing to serious eutrophication of Norton Reservoir. Nutrients enter the reservoir from the Rumford River and from Back Bay Brook, which contains the effluent from the Mansfield secondary treatment plant. Excessive algae levels cause nuisance conditions greatly limiting the reservoir's recreational potential.

Segment 14 - Wading River - The quality of the upper portion of the Wading River is impaired by bacterial contamination from a number of raw sewage discharges and by nutrient inputs that cause moderage algal growth in Chartley and Barrowsville Ponds. The discharge from the Defiance Bleachery in Barrowsville severely degrades the quality of the lower Wading River. This large organic demand lowers the D.O. below criteria.

Segment 15 - Rumford River, Wading River to Taunton River - Due to high nutrient values, algal and plant growth cause a durnal curve in the dissolved oxygen. Bacterial contamination results from the Paul Dever School STP, Lovering Colony STP, and raw sewage entering the river in North Dighton. A significant pollutional load from the Harodite Finishing plant is discharged into the tidal portion of the Three Mile River.

Segments 16 and 17 - Mount Hope Bay - Mount Hope Bay is a relatively enclosed body of water with major freshwater flow entering from the Taunton estuary in the north and with two distinct outlets in the southern portion of the bay. The water quality problems that exist emanate from the municipal and industrial discharges directly into the bay and from the pollutant load carried by the Taunton River.

Heavy development in the City of Fall River is located along the eastern shoreline. The city's primary treatment plant discharges a large load of organic material and suspended solids to the bay. The Fall River sewerage system also has many combined sewers, and 14 overflows are located along the shoreline. During periods of rain, much of the sewage overflows directly to the bay before reaching the treatment plant. Many of the industries in Fall River discharge wastewater to the Quequechan River, which flows into the bay at Battleship Cove. Two electric generating stations, Brayton Point and Montaup, discharge large amounts of cooling water into Mount Hope Bay.

The Taunton River inflow and the discharges in the Fall River area cause two major water quality problems. The large amounts of raw sewage discharged lower the bacteriological quality of the bay. During periods of heavy rain the combined sewer discharges further degrade bacterial quality. All the suspended material in these discharges causes another significant problem. The solids discolor the surface waters and exert a demand on the oxygen when they settle to the bottom.

Mount Hope Bay is also enriched as a result of nutrient loads. The algae that result cause daily variations in the D.O. levels in the bay. During the early morning hours before photosynthesis begins, algal respiration causes the D.O. level to be depleted.

The thermal discharges cause a rise in water temperature in localized areas. In both the 1970 and 1971 surveys during August, the thermal discharge from Brayton Point caused temperatures in excess of 88^{o}F at the mouth of the Lees River.

Segment 18 - Assonet River - Slight coliform violations here are due to non-point sources.

Segment 19 - Quequechan River - There is a severe violation of parameters in this segment due to improperly treated industrial wastes and raw sewage discharges.

TABLE 18

TAUNTON RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Taunton River	From its source to Nemasket River confluence	Above 33.9	6.9	U	C
2	Taunton River	From Nemasket River confluence to Route 24 bridge	33.9-21.7	12.2	U	C
3	Taunton River	From Route 24 bridge to Mill River confluence	21.7-18.5	3.2	U	SB
4	Taunton River	From Mill River confluence to Berkley Bridge	18.5-13.0	5.5	U	SB
5	Taunton River	From Berkley Bridge to mouth at Battleship Cove	13.0-2.7	10.3	U	SB
6	Trout Brook	Entire length	--	4.0	C	C
7	Salisbury Plain and Matfield Rivers	Entire length	--	12.5	U	C
8	Satucket River and its tributaries	Entire length	--	15.0	B&C	B
9	Town River and its tributaries	Entire length	--	9.2	C&U	C
10	Nemasket River	Entire length	--	10.5	C	B
11	Saw Mill Brook	Entire length	--	1.5	U	B
12	Mill River	From Whittenton Dam to confluence with Taunton River	3.5-0.0	3.5	U	B
13a	Rumford River	From source to outlet, Norton Reservoir	25.0-16.7	8.3	C&U	B

TABLE 18 (CONTINUED)

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
13	Rumford River	From outlet, Norton Reservoir, to confluence with Wading River	16.7-12.1	4.6	U	B
14	Wading River	From Chartly confluence to Rumford River confluence	5.2-0.0	5.2	C	B
15	Rumford River	From Wading River confluence to Taunton River	12.1-0.0	12.1	C	B
16	Mount Hope Bay	From Battleship Cove to a point east of a line drawn from Brayton Point to buoy 4 in Mt. Hope Bay and north from Mass.-R.I. state line	--	--	U	SB
17	Mount Hope Bay	Westerly of a line drawn from Brayton Point to buoy 4 in Mt. Hope Bay in R.I. and northerly from the Mass.-R.I. state line	--	--	SB	SB
18	Assonet River	Entire length	--	7.0	B&SB	B&SB
19	Quequechan River	Entire length	--	2.5	U	C

Total Miles of Class B - 18.0
Total Miles of Class SB - 4.0
Total Miles of Class C - 44.1
Total Miles of Unsatisfactory Condition - 67.9

TEN MILE RIVER BASIN

Present Condition

Segment 1 - Above Plainville Center - Non-fecal coliform bacteria and solids were slightly high in this segment in 1968, probably due to land-stripping activities.

Segment 2 - Plainville Center to Whiting Pond Dam - Four industries in Plainville discharge treated effluents; all are inorganic discharges. These effluents contribute to moderately high nutrients in Whiting Pond. Slightly high coliform bacteria indicate septic tank malfunctions in Plainville and North Attleborough; this would also contribute nutrients. Low D.O. values at the inlet to Whiting Pond are attributed to natural processes in the swamp above.

Segment 3 - Whiting Pond Dam to North Attleborough STP - Several treated effluents from jewelry and metal finishing industries in North Attleborough contribute metals and nutrients. Bottom sediments in this segment are extremely high in metals. Coliform bacteria and solids result from urban runoff and sewer overflows. The temperature increase in Falls Pond may be a natural phenomenon.

Segment 4 - North Attleborough STP to Bungay River - Despite conscientious operation, this facility causes severe D.O.-BOD, solids, and nutrient problems, primarily because the plant flow equals or exceeds the flow in the river much of the time.

Segment 5 - Bungay River to Attleboro STP - Numerous jewelry and metal finishing industries discharge treated effluents in Attleboro Center, increasing the nutrient problems as well as adding metals. Two industries in Attleboro and one in Seekonk discharge untreated or partially treated organic wastes to this segment, adding to the D.O., solids, nutrients, and coliform bacteria problems. Bottom sediments are extremely high in metals.

Segment 6 - Attleboro STP to Central Pond outlet - The effects of the treatment plant are offset somewhat by the entrance of the Seven Mile River. Algal blooms are a major problem in this segment due to nutrients from the treatment plant effluent and upstream sources.

Segment 7 - Central Pond outlet to Seekonk River - Since there are no known point discharges to the Ten Mile River in Rhode Island, problems in this segment must be attributed to either Massachusetts discharges or urban runoff. Slight increases in coliform bacteria and turbidity were noted through East Providence and have been attributed to urban runoff; other problems have been attributed to upstream discharges in Massachusetts.

Segment 8 - Bungay River - Moderately high coliform bacteria, slightly high solids and color, and extremely low D.O. (especially in late June-early July) are primarily due to natural causes as the river flows through a swamp. It is felt, however, that the discharge from the National Fish Hatchery contributes to these problems.

Segment 9 - Speedway Brook - Treated effluents from jewelry and metal finishing industries in Attleboro contribute nutrients, as evidenced by algal blooms, and metals. Slightly high coliform bacteria results from urban runoff.

Segment 10 - Seven Mile River above Orrs Pond - Agricultural runoff contributes coliform bacteria, BOD, solids, and nutrients to this segment. Leachate from malfunctioning subsurface disposal systems may also be a problem.

Segment 11 - Seven Mile River from Orrs Pond to Ten Mile River - Coliform bacteria are slightly high, probably due to urban runoff. Low dissolved oxygen values in late afternoon samples taken during the 1968 and 1973 surveys cannot be explained.

Segment 12 - Coles Brook - Slightly high nutrient values were found in this brook during the National Eutrophication Survey of Central Pond and Turner Reservoir. This may be caused by runoff from lawns and a golf course, which would contain nutrients from fertilizers, or by leachate from malfunctioning subsurface disposal systems.

TABLE 19

TEN MILE RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
1	Ten Mile River	Above Plainville Center	Above 19.9	3.2	B	B
2	Ten Mile River	Plainville Center to Whiting Pond Dam	19.9-19.3	0.6	B	B
3	Ten Mile River	Whiting Pond Dam to North Attleborough STP	19.3-15.6	3.7	C	B
4	Ten Mile River	North Attleborough STP to Bungay River	15.6-14.1	1.5	U	C
5	Ten Mile River	Bungay River to Attleboro STP	14.1-7.7	6.4	U	C
6	Ten Mile River	Attleboro STP to Central Pond outlet	7.7-4.7	3.0	U	C
7	Ten Mile River	Central Pond outlet to mouth	4.7-0.0	4.7	C	B
8	Bungay River	Entire length	--	4.5	C	B
9	Speedway Brook	Entire length	--	2.0	U	C
10	Seven Mile River	Above Orrs Pond Dam	Above 2.5	4.5	C	B
11	Seven Mile River	Orrs Pond to Ten Mile River	2.5-0.0	2.5	C	B
12	Coles Brook	Entire length	--	1.5	C	B

Total Miles of Class B - 3.8
Total Miles of Class C - 21.4
Total Miles of Unsatisfactory Condition - 12.9

WESTFIELD RIVER BASIN

Present Conditions

Segment 0 - Above the confluence of the West Branch and the West Branch above the Town of Chester - The upper reaches of the Westfield River flow through mountainous terrain covered with a relatively thin layer of permeable soil. This allows extreme and frequent variations in flow due to runoff. Erosion due to runoff subjects the streams to heavy silt loads and fluctuations in coliform densities. Water quality standards do not apply to conditions brought about by natural causes. Therefore, this segment of the Westfield River does not violate its A and B classifications.

Segment 1 - Lower West Branch and the main stem to Crescent Mills Dam - Along the lower West Branch and the main stem of the Westfield River to Crescent Mills, Class B coliform criteria are continually violated. High coliform densities are due to the discharge of raw sewage from the towns of Chester and Huntington. In addition, the discharge of untreated industrial wastewater from Bendix Abrasives constitutes a violation of Class B standards.

Segment 2 - Crescent Mills Dam to Russell Falls Dam - From the Crescent Mills Dam to the Russell Falls Dam, Class B coliform criteria continue to be violated owing to a carryover effect from Segment 1. Texon, Inc., a paper company, discharges at the top of this segment but treates its wastewater.

Segment 3 - Russell Falls Dam to Woronoco Dam - This segment receives the discharges of the Russell STP and the Westfield River Paper Company. Coliform densities fall in this segment but still occasionally violate Class B criteria. Russell's small extended aeration plant has occasional problems with overloads caused by infiltration. Westfield River Paper Company has only an intermittent discharge from a lagoon system. During the 1974 water quality survey, the occasional overflow from the lagoons to the river caused a rise in nutrient and suspended solids levels in the impoundment below Woronoco.

Segment 4 - Woronoco Dam to Little River confluence - Untreated industrial wastewater from Strathmore Paper Company and raw sewage from the mill houses pollute this segment. Solids, color, and total coliform densities violate Class B criteria and aesthetically degrade the river. During low flow conditions, dissolved oxygen criteria are violated in the upper portion of this segment. High reaeration rates allow oxygen values to recover quickly, however, and the present condition of the segment is C.

Segment 5 - Little River, source to Cobble Mountain Reservoir Dam - The waters of Cobble Mountain Reservoir are used for a public water supply. The reservoir and its feeder streams have a water use classification of A and are designated as an anti-degradation segment. The Division of Environmental Health monitors the water quality in this segment.

Segment 6 - Little River, Cobble Mountain Reservoir Dam to Horton's Bridge - In this segment the backwash of the filters used for the public water supply is discharged to the Little River. This resulted in relatively high suspended solids values in the stream during the 1974 water quality survey. Flow regulation imparted by Cobble Mountain Reservoir can result in prolonged periods of low flow below the dam. Releases from the reservoir can cause wide

variations in stream temperatures and flow regimes during the course of a day. Class B coliform criteria are sometimes violated in this segment. This is probably due to non-point sources from pasture land that abuts the stream along this segment.

Segment 7 - Little River, Horton's Bridge to confluence with Westfield River- Violations of Class C criteria did not occur in this segment during the last water quality survey. Stevens Paper Mills discharges from two mills in this segment. The upper mill does not treat its wastewater. During the 1974 water quality survey, however, the mill was under greatly reduced production. Treatment will be provided at this mill. The wastewater from the lower mill is effectively treated. Toward the confluence of the Little and Westfield Rivers, Columbia Manufacturing Company discharges treated wastewater to the Little River. Three-tenths of a mile upstream from the confluence is the discharge of an untreated municipal combined sewer. The impact of this wastewater is exerted primarily on the main stem of the Westfield River.

Segment 8 - Powdermill Brook, from mile point 2.6 to confluence with Westfield River - Powdermill Brook receives the discharge from Sterling Radiator Company. No known violations of Class B criteria occur.

Segment 9 - Unnamed brook, from mile point 0.6 to confluence with Westfield River - An unnamed brook carries the discharge from the Western Massachusetts Hospital to the Westfield River. This small discharge is treated, and no known violations of Class B criteria occur.

Segment 10 - Confluence with Little River to West Springfield Dam - The combined effects of carryover from upstream discharges on the Westfield and Little Rivers along with untreated combined sewers in the Town of Westfield pollute this segment. Total coliform densities greatly exceed Class B criteria. During low flow conditions, the D.O. content of the stream is depleted. Survey results show that diurnal fluctuations caused by algae were partially responsible for this violation. Therefore, the nutrient fertilization of the stream must be considered a problem at this time. Floating solids and color also degrade the segment. Settled sludge rises to the surface throughout this segment as a result of anaerobic activity in the stream bed.

This segment is the focal point of the stream's oxygen demands because of its relatively low reaeration rates and the lengthy time of travel. Because of the total number of violations and the general aesthetic degradation of the river, the present condition is unsatisfactory in this segment.

Segment 11 - West Springfield Dam to confluence with Connecticut River - This last segment of the Westfield River has high solids, color, and nutrient levels due to carryover from Segment 10. However, higher reaeration rates prevent violations of Class B dissolved oxygen criteria. High total coliform densities are the result of both carryover and non-point sources.

TABLE 20

WESTFIELD RIVER BASIN

CLASSIFICATION - SEGMENTATION

SEGMENT NUMBER	STREAM	DESCRIPTION	MILE POINTS	MILES	PRESENT CONDITION	CLASSIFICATION
0	Westfield River	Above the confluence of the West Branch and the West Branch above the Town of Chester	62.5-25.0 25.0 + 17.5-7.5	65.5	A&B	A&B
1	Westfield River	Lower West Branch and the main stem to Crescent Mills Dam	25.0+7.5-0.0 24.0-24.0	8.5	C	B
2	Westfield River	Crescent Mills Dam to Russell Falls Dam	24.0-21.1	2.9	C	B
3	Westfield River	Russell Falls Dam to Woronoco Dam	21.1-18.5	2.6	C	B
4	Westfield River	Woronoco Dam to Little River confluence	18.5-11.1	7.4	C	B
5	Little River	Source to Cobble Mountain Reservoir Dam	11.1 + above 13.0	---	A	A
6	Little River	Cobble Mountain Reservoir Dam to Horton's Bridge	11.1 + 13.0-4.7	8.3	C	B
7	Little River	Horton's Bridge to confluence with Westfield River	11.1 + 4.7-0.0	4.7	C	C
8	Powdermill Brook	From mile point 2.6 to confluence with Westfield River	10.0 +	2.6	B	B
9	Unnamed brook	From mile point 0.6 to confluence with Westfield River	8.5 + 0.6-0.0	0.6	B	B
10	Westfield River	From confluence with Little River to the West Springfield Dam	11.1-3.9	7.2	U	B
11	Westfield River	From West Springfield Dam to confluence with the Connecticut River	3.9-0.0	3.9	C	B

Total Miles of Class B - 68.7
Total Miles of Class C - 38.3
Total Miles of Unsatisfactory Condition - 7.2

CONCLUSIONS

The Commonwealth of Massachusetts is divided into twenty-seven major drainage basins for the purpose of water quality management planning. Together, these basins drain some 9,645 square miles and comprise 1,462 major river miles. There has been a great deal of improvement throughout the state over the past year. However, evaluation of these improvements is not possible at this time due to data constraints. This is best indicated by the fact that only 32.1% of Massachusetts' major river miles are now known to be meeting state water quality standards--an improvement of only 1.3% over last year's figure.

Although the present quality of many of the state's streams are below desired levels, the causes of degradation are known and the necessary abatement measures have been given high priority so that 1983 fishable/swimmable goals can be met. Costs for construction of publicly-owned wastewater treatment facilities to help reach these goals have been assessed at $3,400,433,000 according to the 1976 needs survey.

It appears from analysis of preliminary data that non-point sources are a significant source of water pollution in many of Massachusetts' river basins. Evaluation of the extent and methods of controlling these sources will be addressed in the Areawide Wastewater Management Plans currently being prepared.

* A copy of the 1977 Facilities Needs Survey will be appended to this report when it becomes available.

TABLE 21

COMMONWEALTH OF MASSACHUSETTS

305 (b) WATER QUALITY INVENTORY SUMMARY

DRAINAGE BASIN		RIVER BASIN OR COASTAL DRAINAGE (MAIN STEM AND MAJOR TRIBUTARIES)	TOTAL MILES ASSESSED	MILES NOW MEETING CLASS B	MILES EXPECTED TO MEET CLASS B BY 1983	MILES NOW MEETING STATE WQ STANDARDS	MILES NOT MEETING STATE WQ STANDARDS
Blackstone		328	106.8	35.7	*	35.7	71.1
Boston Harbor			43.7	0.0	*	6.9	36.8
Buzzards Bay		350	44.5	16.5	*	37.0	7.5
Charles River		265	89.7	1.4	*	1.4	88.3
Chicopee		720	111.5	49.4	*	72.2	39.3
Connecticut			2,949	67.5	5.5	*	5.5	62.0
Deerfield			666	69.9	38.3	*	44.3	25.6
Farmington	(total)		602	18.4	18.4	*	18.4	0.0
	(Mass.)		149					
French & Quinebaug			241	56.6	19.1	*	23.1	33.5
Hoosic	(total)		713	42.6	17.3	*	19.6	23.0
	(Mass.)		165					
Housatonic	(total)		1,950	96.3	26.4	*	30.9	65.4
	(Mass.)		500					
Ipswich & Parker				66.4	33.6	*	33.6	32.8
Merrimack	(total)		5,000	115.4	0.0	*	0.0	115.4
	(Mass.)		1,200					
Millers	(total)		390	57.5	17.3	*	17.3	40.2
	(Mass.)		350					

TABLE 21 (CONTINUED)

DRAINAGE BASIN	RIVER BASIN OR COASTAL DRAINAGE (MAIN STEM AND MAJOR TRIBUTARIES)	TOTAL MILES ASSESSED	MILES NOW MEETING CLASS B	MILES EXPECTED TO MEET CLASS B BY 1983	MILES NOW MEETING STATE WQ STANDARDS	MILES NOT MEETING STATE WQ STANDARDS
Nashua	530	103.7	5.4	*	5.4	98.3
North River	105.4	20.6	11.6	*	11.6	9.0
SUASCO	381	86.1	0.0	*	0.0	86.1
Sudbury	169					
Assabet	175					
Concord	27					
Taunton	530	134	18.0	*	35.2	98.8
Ten Mile	49	38.1	3.8	*	3.8	34.3
Westfield	517	114.2	68.7	*	73.4	40.3
TOTAL	9,995.4	1,483.0	386.4		475.3	1,007.7
% of Total Miles			26.0		32.1	67.9

* Information not available at this time. As it becomes available, it will be included in the appropriate annual update of the 305(b) submittal.

APPENDIX I

COMMONWEALTH OF MASSACHUSETTS
WATER RESOURCES COMMISSION
DIVISION OF WATER POLLUTION CONTROL

RULES AND REGULATIONS FOR THE ESTABLISHMENT OF MINIMUM WATER QUALITY STANDARDS AND FOR THE PROTECTION OF THE QUALITY AND VALUE OF WATER RESOURCES

The Division of Water Pollution Control, acting under the authority of Sections 27 (5) and (12) of Chapter 21 of the General Laws and other Acts relating thereto enabling, hereby adopts and established the following Rules and Regulations to restore, maintain, and enhance the quality of the waters of the Commonwealth; to designate the uses for which the various waters of the state shall be maintained and protected; to prescribe the water quality standards required to sustain the designated uses; and prescribe regulations necessary for implementing, achieving and maintaining the prescribed water quality.

Filed with Secretary of State May 2, 1974

RULES AND REGULATIONS
FOR THE ESTABLISHMENT OF
MINIMUM WATER QUALITY STANDARDS
AND FOR THE PROTECTION OF THE
QUALITY AND VALUE OF WATER RESOURCES

REGULATION I Definitions

The terms used in the following regulations are defined as follows:

1. Appropriate Treatment - means that degree of treatment required for the waters of the Commonwealth to meet their assigned classifications or any terms, conditions, or effluent limitations established as part of any permit to discharge issued under the provisions of the Massachusetts Clean Waters Act, or any effluent standard or prohibition established by the Division under authority of Section 27 (6) of the Massachusetts Clean Waters Act.

2. Division - means the Commonwealth of Massachusetts, Division of Water Pollution Control.

3. Person - means any agency or political subdivision of the Commonwealth, public or private corporation or authority, individual, partnership or association, or other entity, including any officer of a public or private agency or organization, upon whom a duty may be imposed by or pursuant to any provision of Sections 26-53 inclusive, of Chapter 21 of the General Laws.

4. Sewage - means the water-carried waste products or discharges from human beings, sink wastes, wash water, laundry waste and similar so-called domestic waste.

5. The "Waters of the Commonwealth" and "Waters" - means all waters within the jurisdiction of the Commonwealth, including, without limitation, rivers, streams, lakes, ponds, springs, impoundments, estuaries, coastal waters, and ground waters.

6. Fresh Waters - means waters not subject to the rise and fall of the tide.

7. Salt Waters - means all waters subject to the rise and fall of the tide.

8. Cold Water Stream - means a stream capable of sustaining a population of cold water fish, primarily Salmonids.

9. Seasonal Cold Water Stream - means a stream which is only capable of sustaining cold water fish during the period of September 15 through June 30.

10. Waste Treatment Facility - processes, plants, or works, installed for the purpos of treating, neutralizing, stabilizing or disposing of wastewater.

11. Pollutant - means any element or property of sewage, agricultural, industrial, or commercial waste, run-off, leachate, heated effluent, or other matter in whatever form and whether originating at a point or non-point source, which is or may be discharged, drained or otherwise introduced into the waters of the Commonwealth.

12. Discharge - means the flow or release of any pollutant into the waters of the

Commonwealth.

13. Wastewater - means sewage, liquid or water-carried waste from industrial, commercial, municipal, private or other sources.

14. Zone of Passage - means a continuous water route of the volume, area and quality necessary to allow passage of free-swimming and drifting organisms with no significant effect produced on the population.

Regulation II - Water Quality Standards

1 - The Water Quality Standards adopted by the Massachusetts Division of Water Pollution Control on March 3, 1967 and filed with the Secretary of State on March 6, 1967 are hereby repealed, except that existing "River Basin Classifications" based on the 1967 Standards will remain in full force and effect until reclassified in accordance with the following standards.

2 - To achieve the objectives of the Massachusetts Clean Waters Act and the Federal Water Pollution Control Act Amendments of 1972 and to assure the best use of the waters of the Commonwealth the following standards are adopted and shall be applicable to all waters of the Commonwealth or to different segments of the same waters:

3 - Fresh Water Standards

Class A - These waters are designated for use as sources of public water supply in accordance with the provisions of Chapter 111 of the General Laws.

Water Quality Criteria

Item	Criteria
1. Dissolved oxygen	Not less than 75% of saturation during at least 16 hours of any 24 hour period and not less than 5 mg/l at any time. For cold wate streams the dissolved oxygen concentration shall not be less than 6 mg/l. For seasonal cold water streams the dissolved oxygen concentration shall not be less than 6 mg/l during the season.
2. Sludge deposits-solid refuse-floating solids-oil-grease-scum	None allowable
3. Color and turbidity	None other than natural origin.
4. Total Coliform bacteria per 100 ml.	Not to exceed an average value of 50 during any monthly sampling period.
5. Taste and odor	None other than of natural origin
6. pH	As naturally occurs.
7. Allowable temperature increase	None other than of natural origin
8. Chemical constituents	None in concentrations or combinations which would be harmful or offensive to humans, or harmful to animal or aquatic life.

9. Radioactivity	None other than that occurring from natural phenomena.

Class B - These waters are suitable for bathing and recreational purposes, water contact activities, acceptable for public water supply with treatment and disinfection, are an excellent fish and wildlife habitat, have excellent aesthetic values and are suitable for certain agricultural and industrial uses.

Item	Criteria
1. Dissolved oxygen	Not less than 75% of saturation during at least 16 hours of any 24 hour period and not less than 5 mg/l at any time. For cold water streams the dissolved oxygen concentration shall not be less than 6 mg/l. For seasonal cold water streams the dissolved oxygen concentration shall not be less than 6 mg/l during the season.
2. Sludge deposits-solid refuse-floating solids-oil-grease-scum	None other than of natural origin or those amounts which may result from the discharge from water treatment facilities providing appropriate treatment. For oil and grease of petroleum origin the maximum allowable concentration is 15 mg/l.
3. Color and turbidity	None in such concentrations that would impair any uses specifically assigned to this class.
4. Coliform bacteria per 100 ml	Not to exceed an average value of 1000 nor more than 1000 in 20% of the samples.
5. Taste and odor	None in such concentrations that would impair any uses specifically assigned to this class and none that would cause taste and odor in edible fish.
6. pH	6.5 - 8.0
7. Allowable temperature increase	None except where the increase will not exceed the recommended limit on the most sensitive receiving water use and in no case

	exceed 83° F in warm water fisheries, and 68°F in cold water fisheries, or in any case raise the normal temperature of the receivin water more than 4°F.
8. Chemical constituents	None in concentrations or combinations which would be harmful or offensive to human, or harmful to animal or aquatic life or any wate use specifically assigned to this class.
9. Radioactivity	None in concentrations or combinations in excess of the limits specified by the United States Public Health Service Drinking Water Standards.

Class B1 - The use and criteria for Class B1 shall be the same as for Class B with the exception of the dissolved oxygen requirement which shall be as follows for this class:

Item	Criteria
1. Dissolved oxygen	Not less than 5 mg/1 during at least 16 hours of any 24 hour period, nor less than 3 mg/1 at any time. For seasonal cold water fisheries at least 6 mg/1 must be maintained during the season.

Class C - These waters are suitable for recreational boating and secondary water contact recreation, as a suitable habitat for wildlife and fish indigenous to the region, for certain agricultural and industrial uses, have good aesthetic values, and under certain conditions are acceptable for public water supply with treatment and disinfection.

Item	Criteria
1. Dissolved oxygen	Not less than 5 mg/1 during at least 16 hours of any 24 hour period, nor less than 3 mg/1 at any time. For seasonal cold water fisheries at least 6 mg/1 must be maintained during the season.
2. Sludge deposits-solid refuse-floating solids-oil-grease-scum	None other than of natural origin or those amounts which may result

		from the discharge from waste treatment facilities providing appropriate treatment. For oil and grease of petroleum origin the maximum allowable concentration is 15 mg/l.
3.	Color and turbidity	None allowable in such concentrations that would impair any uses specifically assigned to this class.
4.	Coliform bacteria	None in such concentrations that would impair any usages specifically assigned to this class, see Note 1.
5.	Taste and odor	None in such concentrations that would impair any uses specifically assigned to this class, and none that would cause taste and odor in edible fish.
6.	pH	6.0 - 8.5
7.	Allowable temperature increase	None except where the increase will not exceed the recommended limits on the most sensitive receiving water use and in no case exceed 83°F in warm water fisheries, and 68°F in cold water fisheries, or in any case raise the normal temperature of the receiving water more than 4°F.
8.	Chemical constituents	None in concentrations or combinations which would be harmful or offensive to human life, or harmful to animal or aquatic life or any other water use specifically assigned to this class.
9.	Radioactivity	None in such concentrations or combinations in excess of the limits specified by the United States Public Health Service Drinking Water Standards.

Note I - no bacteria limit has been placed on Class "C" waters because of the urban runoff and combined sewer problems which have not yet been solved. In waters of this class not subject to urban runoff or combined sewer discharges the bacterial quality of the water should be less than an average of 5,000 coliform bacteria/100 ml during any monthly sampling period. It is the objective of the Division to eliminate all point and non-point sources of pollution and to impose bacterial limits on all waters.

Class C1 - The use and criteria for Class C1 shall be the same as for Class C with the exception of the dissolved oxygen (and temperature) requirements which shall be as follows for this Class:

Item	Criteria
1. Dissolved oxygen	Not less than 2 mg/l at any time.

Salt Water Standards

Class SA - These are waters of the highest quality and are suitable for any high water quality use including bathing and other water contact activities. These waters are suitable for approved shellfish areas and the taking of shellfish without depuration, have the highest aesthetic value and are an excellent fish and wildlife habitat.

Water Quality Criteria

Item	Criteria
1. Dissolved oxygen	Not less than 6.5 mg/l at any time
2. Sludge deposits-solid refuse-floating solids-oil-grease-scum	None other than of natural origin or those amounts which may result from the discharge from waste treatment facilities providing appropriate treatment. For oil and grea of petroleum origin the maximum allowable concentration is 15 mg/
3. Color and turbidity	None in such concentrations that will impair any uses specifically assigned to this class.
4. Total Coliform bacteria per 100 ml	Not to exceed a median value of 7(and not more than 10% of the sampl shall ordinarily exceed 230 durin any monthly sampling period.
5. Taste and odor	None allowable
6. pH	6.8 - 8.5

7. Allowable temperature increase	None except where the increase will not exceed the recommended limits on the most sensitive water use.
8. Chemical constituents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe or unsuitable for fish or shellfish or their propagation, impair the palatability of same, or impair the waters for any other uses.
9. Radioactivity	None in concentrations or combinations in excess of the limits specified by the United States Public Health Service Drinking Water Standards.

Class SB - These waters are suitable for bathing and recreational purposes including water contact sports and industrial cooling, have good aesthetic values, are an excellent fish habitat and are suitable for certain shell fisheries with depuration (Restricted Shellfish Areas).

Item	Criteria
1. Dissolved oxygen	Not less than 5.0 mg/l at any time.
2. Sludge deposits-solid refuse-floating solids-oils-grease-scum	None other than of natural origin or those amounts which may result from the discharge from waste treatment facilities providing adequate treatment. For oil and grease of petroleum origin, the maximum allowable concentration is 15 mg/l.
3. Color and turbidity	None in such concentrations that would impair any uses specifically assigned to this class.
4. Total Coliform bacteria per 100 ml	Not to exceed an average value of 700 and not more than 1000 in more than 20% of the samples.
5. Taste and odor	None in such concentrations that would impair any uses specifically assigned to this class and none that would cause taste and odor in edible fish or shellfish.
6. pH	6.8 - 8.5

7.	Allowable temperature increase	None except where the increase will not exceed the recommended limits on the most sensitive water use.
8.	Chemical constituents	None in concentrations or combinations which would be harmful to human, anima or aquatic life or which would make th waters unsafe or unsuitable for fish o shellfish or their propagation, impair the palatability of same, or impair th water for any other use.
9.	Radioactivity	None in such concentrations or combin-ations in excess of the limits specifie by the United States Public Health Service Drinking Water Standards.

Class SC - These waters are suitable for aesthetic enjoyment, for recreational boating, as a habitat for wildlife and common food and game fishes indigenous to the region, and are suitable for certain industrial uses.

Item		Criteria
1.	Dissolved oxygen	Not less than 5 mg/l during at least 16 hours of any 24 hour period nor les than 3 mg/l at any time.
2.	Sludge deposits-solid refuse-floating solids-oil-grease-scum	None other than of natural origin or those amounts which may result from th discharge from waste treatment facilit providing appropriate treatment. For and grease of petroleum origin the maximum allowable concentration is 15
3.	Color and turbidity	None in such concentrations that would impair any uses specifically assigned this class.
4.	Total Coliform bacteria	None in such concentrations that would impair any uses specifically assigned this class. See Note 2
5.	Taste and odor	None in such concentrations that would impair any uses specifically assigned this class and none that would cause taste and odor in edible fish or shell
6.	pH	6.5 - 8.5
7.	Allowable temperature increase	None except where the increase will no exceed the recommended limits on the m sensitive water use.

8. Chemical constituents	None in concentrations or combinations which would be harmful to human, animal or aquatic life or which would make the waters unsafe for fish or shellfish or their propagation, impair the palatability of same, or impair the water for any other use.
9. Radioactivity	None in such concentrations or combinations in excess of the limits specified by the United States Public Health Service Drinking Water Standards.

Note 2: no bacteria limit has been placed on Class "SC" waters because of the urban runoff and combined sewer problems which have not yet been solved. In waters of this class not subject to urban runoff or combined sewer discharges, the bacterial quality of the water should be less than an average of 5,000 coliform bacteria/100 ml during any monthly sampling period. It is the objective of the Division to eliminate all point and non-point sources of pollution and to impose bacterial limits on all waters.

Regulation III - General Provisions

1. It is recognized that certain waters of the Commonwealth possess an existing quality which is better than the standards assigned thereto.

   A. Except as otherwise provided herein, no new discharge of wastewater will be permitted into any stream, river or tributary upstream of the most upstream discharge of wastewater from a municipal waste treatment facility or municipal sewer discharging wastes requiring appropriate treatment as determined by the Division. Any person having an existing wastewater discharge shall be required to cease such discharge and connect to a municipal sewer unless it is shown by said person that such connection is not available or feasible. Existing discharges not connected to a municipal sewer will be provided with the highest and best practical means of waste treatment to maintain high water quality. New discharges from a municipal waste treatment facility into such waters will be permitted provided that such discharge is in accordance with a plan develope under the provisions of Section 27(10) of Chapter 21 of the General Laws (Massachusetts Clean Waters Act) which has been the subject of a Public Hearing and approved by the Division. The discharge of industrial liquid coolant wastes in conjunction with the public and private supply of heat or electrical power may be allowed provided that a permit has been issued by the Division and that such discharge is in conformance with the terms and conditions of the permit and in conformance with the water quality standards of the receiving waters.

   B. Except as otherwise provided herein, no new discharge of wastewater will be permitted in Class SA or SB waters. Any person having an existing discharge of wastewater into Class SA or SB waters will be required to cease said discharge and to connect to a municipal sewer unless it is shown by said person that such connection is not available or feasible. Existing discharges not connected to a municipal sewer will be provided with the highest and best practical means of waste treatment to maintain high water quality. New discharges from a waste treatment facility into such waters will be permitted provided such discharge is in accordance with a plan developed under the provisions of Section 27(10) of Chapter 21 of the General Laws (Massachusetts Clean Waters Act) which has been the subject of a Public Hearing and approved by the Division. The discharge of industrial coolant wastes in conjunction with the public and private supply of heat or electrical power may be allowed provided that a permit has been issued by the Division and that such discharge is in conformance with the terms and conditions of the permit and in conformance with the Water Quality Standards of the receiving waters.

2. The latest edition of the Federal publication "Water Quality Criteria" will be considered in the interpretation and application of bioassay results.

3. The latest edition of Standard Methods for Examination of Water and Wastewater, American Public Health Association, will be followed in the collection, preservation, and analysis of samples. Where a method is not given in the standards methods, the latest procedures of the American Society for Testing Materials (ASTM) will be followed.

4. The average minimum consecutive 7-day flow to be expected once in 10 years shall be used in the interpretation of the standards.

5. In the discharge of waste treatment plant effluents into receiving waters, consideration shall be given both in time and distance to allow for mixing of effluent and stream. Such distances required for complete mixing shall not effect the water use classifications adopted by the Division. However, a zone of passage must be provided wherever mixing zones are allowed.

6. There shall be no new discharges of nutrients into lakes or ponds. In addition, there shall be no new discharge of nutrients to tributaries of lakes or ponds that would encourage eutrophication or growth of weeds or algae in these lakes or ponds.

7. Any existing discharge containing nutrients in concentrations which encourage eutrophication or growth of weeds or algae shall be treated to remove such nutrients to the maximum extent technically feasible.

8. These Water Quality Standards do not apply to conditions brought about by natural causes.

9. All waters shall be substantially free of products that will (1) unduly affect the composition of bottom fauna, (2) unduly affect the physical or chemical measure of the bottom, (3) interfere with the spawning of fish or their eggs.

10. No person shall discharge any pollutants into any waters of the Commonwealth which shall cause a violation of the standards.

11. A person shall submit to the Division for approval all plans for the construction of or addition to any waste treatment facility and no such facility may be constructed, modified or enlarged without such approval.

12. Cold water and seasonal cold water streams shall be those listed by the Massachusetts Division of Fisheries and Game.

13. Whoever violates any provision of these regulations shall (a) be fined not less than two thousand five hundred dollars nor more than twenty-five thousand dollars for each day of such violation or its continuance, or by imprisonment for not more than one year, or by both; or (b) shall be subject to a civil penalty not to exceed ten thousand dollars per day of such violation, which may be assessed in an action brought on behalf of the Commonwealth in any court of competent jurisdiction, pursuant to Section 42 of Chapter 21 of the Massachusetts General Laws.

14. The Division and its duly authorized employees shall have the right to enter at all reasonable times into or on, any property, public or private, for the purpose of inspecting and investigating conditions relating to pollution or possible pollution of any waters of the Commonwealth, pursuant to Section 40 of Chapter 21 of the Massachusetts General Laws.

15. If any regulation, paragraph, sentence, clause, phrase or word of these regulations shall be declared invalid for any reason whatsoever, that decision shall not affect any other portion of these regulations, which shall remain in full force and effect and to this end the provisions of these regulations are hereby declared severable.

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